The Organizational Impacts of
Office Automation:
An Eclectic Guide for the Practical Manager

by

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THOMAS RALPH ELLIOTT

Submitted to the Alfred P. Sloan School of Management
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ABSTRACT

There is a sufficiently large body of experience with the
implementation of various office automation technologies to begin
to appreciate some of the organizational effects these
technologies can have: changes in job content, in the make-up of
working groups, in relations between managers and subordinates,
in the nature of the interactions between offices and other
groups in the same or different organizations. Until very
recently, however, there have been no systematic attempts to
apply to office automation the practical and theoretical work
that has been done in organizational studies in the last few
decades: this essay tries to help fill this gap in the
literature.

After briefly describing the major office automation
technologies and some of the very general impacts that
information technology has on organizations and people within
them, this essay discusses five major approaches to
organizational analysis: sociotechnical analysis; job
enrichment; Office Analysis Methodology; planned change
management; and political analysis. These points of view are
then applied selectively to some of the issues that are typically
associated with the planning, implementation, and monitoring of
office automation systems.

This essay does not attempt to unify the contributing
methodologies into a single explanatory model. Instead, the
focus is on providing a set of analytic tools that a manager can
apply to particular situations as the logic of those situations
dictates.

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Chapter 1

INTRODUCTION

Even though the field of office automation is not that old, at least in its present form, there is a growing body of practical experience with the organizational effects of introducing new information technologies into office settings. Similarly, there is a substantial body of theoretical work in the area of organizational diagnosis, job design, and change management, supported by field study and practical experience, that has potential relevance for the implementation of office automation technologies. Some office automation issues are essentially technological, but most of the ones that managers contend with are organizational or have a large organizational component. As such, these issues might well lend themselves to approaches that theorists have applied to other sorts of organizational topics. However, relatively little has been done to use modern organizational theory to systematize the practical experience of managers with office automation.

Some large organizations may have managers whose sole responsibility is to oversee office automation projects; these
people may have the time and resources to conduct extensive studies themselves to meet their organization's particular needs. Most managers with office automation responsibilities, however, are likely to have other duties and only limited time and inclination to reflect on organizational theory as an approach to their problems. This essay is an attempt to meet the needs of such managers by linking together some diverse schools of organizational theory as a way of assessing the organizational impacts of a proposed office automation project or for understanding the dynamics of a project already in progress.

It is worth noting that "organizational impacts" is not necessarily a phrase synonymous with "problems," although problems and problem-solving naturally occupy a great deal of managerial attention. Automation technology can as readily create challenging and rewarding jobs as make office work dull and repetitive. It can support the broadest organizational goals as easily as it can enhance narrow and specific tasks. The introduction of an office automation technology can be the occasion for a restructuring of the office that benefits all concerned: it need not be a zero-sum game. It is my conviction that organizational theory can help a manager recognize and exploit the positive potential of office automation, as well as avoid the difficulties associated with it.

There is no generally accepted definition of what "office automation" really is. The phrase is certainly used as though
there were, or at least as though there were a common
understanding of what cluster of ideas, organizational patterns,
and machines it represents. However, I think this is a
misleading shorthand, at least for present purposes, since it
makes it difficult to approach organizational impacts at a
specific enough level to be useful. For this reason, I have
tried to refer in this essay to office automation "technologies"
and "systems," except when the subject is clearly general enough
to use "office automation." In particular, I have tried to avoid
attributing specific organizational phenomena to "office
automation." The logic of this choice is discussed in the
opening section of Chapter 2, which goes on to review some of the
major technologies that are usually included in discussions of
office automation.

Chapter 3 reviews in a fairly general way the major effects
that information technologies, including office technologies,
have had on people at work. Automation has historically been of
much concern in the areas of employment levels and job security;
to the extent that office automation technologies are like those
in the automation of manufacturing—or are perceived as being
so—they can have a significant effect on employment. On a more
micro level, these technologies can also have a profound effect
on the content of individual jobs and the roles of work groups
within an organization. Finally, specific technologies have had
measurable effects on the physical and mental well-being of those
who work with them. Some of these effects have been fairly well
documented, while others are still somewhat conjectural, but all should be of concern to the manager.

Chapter 4 briefly summarizes five different approaches to the analysis of organizational issues: sociotechnical analysis; job enrichment; the Office Analysis Methodology (OAM) being developed at MIT's Laboratory for Computer Science; planned change management; and political analysis as it has been applied to management information systems. Clearly, this is not an exhaustive list of all schools of organizational thought, or even of all those that might be useful in thinking about office automation. However, they seem to me to provide complementary theoretical frameworks that can be very helpful in looking systematically at the organizational impacts of various technologies.

Each of the approaches has some special utility. Sociotechnical analysis is valuable for the explicit recognition it gives to the different systems within any organization that, in their interactions, transform inputs to outputs. Job enrichment shares some of the same conceptual underpinnings with sociotechnical analysis, notably a concern for job satisfaction as an index of organizational effectiveness, but it focuses attention on the design of individual jobs. OAM, which grows out of a data processing systems design tradition, is particularly valuable in its attempt to use a minimum of analytic resources to define the systems that make up the office. It should be noted that OAM is a technique that is still under development; readers
interested in the current state of the development project should get in touch with the Office Automation Group at the Laboratory for Computer Science, MIT.

Planned change management, or organizational development, as it is also called, is a body of thought that has grown out of the experience of academics and consultants who have observed and participated in the efforts of large organizations to design and implement major changes in procedures. It is particularly valuable for its recognition of the fact that the impact of a change is as much a function of the process of making the change as it is of the nature of the change itself. Finally, a number of researchers have begun using the perspective of political analysis to look at the reactions of organizations to the introduction of computer-based systems or to changes in existing systems. Because this approach focuses on changes in the distribution of power, it is an effective device for assessing some of the practical considerations of implementing office automation technologies in complex organizations.

These first chapters provide a general introduction to the organizational issues involved in office automation technologies and to some of the different ways to look at them. The next three chapters attempt to show how the organizational theories can be used to analyze specific issues that are likely to be relevant to most office automation technologies. Although this essay is primarily a literature review and synthesis, illustrative examples have been drawn from actual situations.
where possible. Where these examples have been taken from published work, they are so cited. The absence of citation for an example indicates that it comes from interviews or personal observation with people and organizations that have requested confidentiality. For convenience, the issues have been grouped temporally: those associated with analysis and planning in Chapter 5; implementation in Chapter 6; and monitoring and evaluating in Chapter 7. Chapter 8 is a convenient summary of these issues.
Chapter 2

TECHNOLOGY OVERVIEW

It is reasonable to argue that there is no such thing as "office automation," at least in the sense of being a clearly defined entity whose presence or absence is obvious and unambiguous to the observer. Office automation is best understood as a sort of collective noun describing the support of office functions by one or more information technologies—which are themselves sometimes ill-defined aggregations of hardware, software, and organizational procedures.

There is a lot of discussion, particularly in vendors' sales literature, about "the totally integrated office of the future," in which all office functions will be so tied together in an information processing and communicating network that it won't make sense to speak of separate technologies. While great technical strides are being taken toward achieving such integration, with such products as the Xerox Ethernet(r), the "office of the future" as a state of organization is probably in a very far future indeed, if only because no one understands
enough about how offices work with current technology to manage a systematic integration of office functions under a new technology.

Furthermore, since few managers are charged with implementing "the office of the future" relative to the number who are responsible for introducing word processing or electronic mail or teleconferencing, the technology-by-technology approach has a strong practical appeal. This approach also reflects the fact that many of the organizational impacts are likely to be application specific, rather than functions of automation technology in general: the organizational effects of centralized word processing, for example, are likely to be very different from those of an electronic mail system.

For the purposes of this essay, therefore, office automation will be approached as a loose confederation of technologies that share a common base in microelectronics. Still, it would be foolish to plan implementation of one of the office automation technologies without considering the possibility of integrating other technologies and without considering the potential impacts of those technologies. As a way to approach a practical assessment of organizational effects, "the office of the future" is far too vague a concept; as an indication of a trend it is useful to keep in mind.
2.1 Word Processing

Word processing is the oldest and most firmly established of the office automation technologies, going back to the mid 1960's with the introduction of the IBM Magnetic Tape Selectric Typewriter (MT/ST). From its origins as a way to produce large volumes of standard output like form letters and lengthy standardized legal documents, word processing has grown in flexibility and range of applications, so that it is safe to describe it in only the most general of terms, as the production and manipulation of text through electronically enhanced typing systems.

Word processing can be accomplished through stand-alone text editing machines, shared logic or otherwise communicating machines, or through word processing software running on data processing systems. The first two categories are more likely to be designed for use in traditional typing situations, while the third is typically a convenient add-on to an essentially data processing environment.

The prototypical stand-alone machine is the IBM Mag Card typewriter, a lineal descendant of the MT/ST that uses magnetic cards as a storage medium. (Other stand-alone ones are made by Lanier, Vydec, Xerox, and numerous other vendors, although communication features that link individual machines are increasingly common.) Since stand-alone ones are almost always designed to be word processors in a secretarial environment,
their text editing functions are hard-wired and have specially defined keys. They are specialized machines intended for a single task, and although IBM originally pushed the concept of the word processing center built around Mag Cards, there is no technological imperative that argues for grouping stand-alone machines. Some of the traditional applications for stand-alones are now being filled by so-called "electronic typewriters" like the Qyx and the IBM Models 50 and 60. These are essentially sophisticated electric typewriters with some memory and perhaps a one-line visual display; they may or may not have detachable storage media like magnetic cards or diskettes.

Shared logic systems are becoming increasingly popular, since they permit two or more work stations to use the power of a central processing unit (CPU) to do some of the more sophisticated text editing functions like global search and replace (finding every occurrence of a word or phrase in a document and replacing it with another). In addition, since the CPU can support a number of work stations, each cheaper than a stand-alone unit, the cost per work station of the system can be reduced. The obvious disadvantage of the shared logic approach is that if the CPU goes down, the system goes down. To some extent this difficulty can be avoided if the work stations are sufficiently "intelligent"--i.e., have sufficient self-contained computing power--to perform some functions independently of the CPU.
Since the CPU is the most expensive component of such a system, the cost per work station declines as more stations are added. Thus, only offices above a certain size can take advantage of the scale economies inherent in a shared logic system. Shared logic systems may also be somewhat more confining in terms of physical movement of the equipment after installation, if the original installation was not wired with flexibility in mind.

Organizations already using computers for data processing can implement word processing fairly easily by installing one of a number of commercially available text editing software packages like Prime's Runoff(r), Honeywell's WORDPRO(r), or Basic Four's DataWord(r). If print quality is not an issue, existing input/output devices can be used; otherwise, so-called letter quality printers are available. Many microcomputers, including hobbyist computers, can do word processing with fairly inexpensive software, although the degree of text editing sophistication may be severely limited by the available memory. The advantage of this approach for an organization is economic: for a fairly small incremental cost the capabilities of an existing system can be expanded substantially. The primary disadvantage is that because the host computer is not designed for word processing some operations that are relatively simple on dedicated word processors can become multi-step coding problems: moving blocks of text is an example.
Most word processing hardware coming onto the market today features video display, which is generally felt to make composition and editing a good deal easier than on "blind" machines like the Mag Card. (Wohl 1979). The increase in use of video display terminals (VDTs) has raised some significant occupational safety and health issues, which will be discussed in Chapter 3. Output in most systems comes from an impact printer, either built around the "golf ball" typing element found on the IBM Selectric, or the "daisy wheel" found on Qume and Diablo printers. IBM has recently introduced a high speed "ink jet" printer that electrostatically charges microscopic ink droplets and sprays them onto the paper, and laser-printed output is also available. Impact printers obviously tend to be loud, and one of the advantages of VDT based systems is that printers are needed only for final output, and they can be located away from workstations to minimize the noise effect.

2.2 Integrated Word and Data Processing

In concept, integrated word and data processing (WP/DP) is very similar to running word processing software on a data processing system, in that it makes the same amount of computing power available to both functions. However, the ultimate purpose of WP/DP is to perform in the same job and without significant delay operations that would ordinarily be called word or data
processing and performed separately. An example would be the production of a customized insurance policy, where the issuing agent would supply both the substance of the policy and the figures needed to calculate rates; the integrated system would produce the policy document, calculating and inserting figures as necessary. A system designed to support such integrated processing could be expected to have easier coding for the word processing functions it performs than the typical add-on word processing software discussed in the preceding section. Wang Laboratories' Integrated Information Systems are examples of WP/DP systems: at the lower end, configurations of up to 32 workstations and other peripheral devices can be supported with word processing and computational capabilities using a version of BASIC (OIS with OFFICE-BASIC); at the upper end up to 128 peripherals can be linked to one of Wang's VS series computers for additional power. Other major manufacturers, including Xerox, are actively developing and marketing WP/DP systems.

One observer has noted that "there are some people, mainly vendors, who would have the customer believe integrated systems are here. This is rarely true." (Wohl 1979) Indeed, so-called integrated applications often exhibit a sharing, not an integration of resources; that is, both word and data processing are performed on the same terminal, even by the same person, but at different times and as separate tasks. It may be that there are a limited number of office situations in which genuine WP/DP
is truly useful. Nevertheless, the capability exists in some form today, and is likely to be more widely available in the future.

2.3 Records Management and Electronic Filing

The creation of documents through word processing is only one step in expediting office operations; retrieving and making use of the documents is another, and one that bears more directly on the problem of increasing managerial productivity. As Poppel (1979) observes,

Most managers and professionals waste a significant amount of time trying to find a piece of information which either they generated or received on some prior occasion. Even worse, they can not include in their search documents which they have forgotten or of whose existence they are unaware.

Once a document has been created through any electronic process, storing it on a magnetic medium is a trivial problem. What is not trivial is the development of indexing and retrieval tools that make the stored document accessible; without them it is extremely hard to find a "document" that exists only as an invisible string of magnetic dots.

The problem of records management is being increasingly addressed by office automation vendors as well as by traditional data processing vendors. IBM's Office System 6 product line, which came on the market in the late 1970's, included the capability of indexing and retrieving stored records with access
by key words, singly or in combination. Software is also available for larger shared logic systems that permits useful electronic filing. With Datapoint's AIM(r) package, for example,

The user need only key in combinations of English words describing a document and the system will report on the documents containing these combinations. Additional words may be added until a small number of documents has been defined. To aid in the search, the user can view the lines in the document in which the specified words appear. (Wohl 1979)

In essence, these retrieval techniques use some of the principles that enable database management systems to manipulate larger and generally somewhat more standardized collections of records.

Retrieval systems, however, do not address the problem that much potentially useful information does not exist in magnetic storage but on paper. Inputting existing paper documents is extremely tedious and time-consuming; optical character recognition devices (OCRs) exist that can scan typed documents and convert them with reasonable accuracy to electronic impulses, but they are as yet unable to deal effectively with handwriting. (Research is being done in this area, and machines such as the Kurzweil Data Entry Machine have a remarkable range of readable inputs, but they are still very expensive: the basic Kurzweil machine costs from $70-85,000, with maintenance at $1000 per month.)

The electronic filing system can, of course, store key words or other identifiers from unconverted hard copy documents and thus incorporate them in the indexing system, even if retrieval
is still manual. Alternatively, documents can be captured with microfilming or other micrographic techniques, and the photographic images retrieved in a more automated fashion: Planning Research Corporation makes such a system, called Telefiche (tm), that is capable of handling storage, retrieval, and transmission of document images and digital computer data using the same equipment. As the Yankee Group (1979) laconically notes in its report, "it is very expensive."

2.4 Electronic Mail

"Electronic mail" refers to a communications system, consisting of a network of terminals and a central processor, that transmits written messages. Such a system differs from telex or communicating word processors in that the central processor permits storage of messages, meaning that the recipient does not need to be aware that a message is being sent. This feature, and the fact that communication in such a system is written, make electronic mail much closer to paper mail than to the telephone, although of course they share transmission speed. Since some filing capability is needed for the system to operate at all, many electronic mail systems go a step further and include the sort of file management capabilities discussed in the preceding section.

Although various systems have different features and
procedures, most operate in roughly the same way. The message sender composes the message at a terminal, using it in effect as a word processor to edit the message into its final form. The sender then specifies who is to receive the message, which may be one individual or an entire distribution list, and sends it. Sending consists of transmitting the message to some central storage location along with a notification to the recipients; typically, this notification will take the form of a message that appears when the recipients next log onto the system or ask for messages, indicating that there is mail in their "mailboxes."

(Some systems are able to notify the recipient actively when mail is received, via lights, screen messages, or other means.) The recipient then has the option of reading the mail immediately or, in some systems, reading the name of the sender and a brief description of the message. Most systems permit forwarding messages to third parties and will produce hard copies on request. If the appropriate hardware is available, electronic mail can be sent and received from any location from which the host computer is accessible.

Several arguments can be made for electronic mail. It is much faster and more reliable than the physical transmission of paper documents, while at the same time it avoids many of the drawbacks of telephony: a written record is available; the sender and receiver do not have to be free to communicate at the same time; the problem of restricted "time windows" in
communicating to distant time zones is eliminated; and since the recipient in effect always "calls in for messages," the sender doesn't need to know the recipient's location in order to communicate. The increasing availability of portable terminals also means that swift communication from remote locations is possible.

Electronic mail in varying degrees of sophistication is available from most major vendors of office automation hardware. In addition, software is commercially available to be installed in an organization's existing computer system to permit it to function as an electronic mail network. BBN Information Management Corporation markets a system called InfoMail(tm) designed to run on IBM and DEC computers; Computer Corporation of America markets a similar product called COMET(tm), which it also makes available on a subscription time sharing basis, using its own computer.

2.5 Other Office Automation Technologies

2.5.1 Calendaring and Tickler Files

Computer systems can be used to maintain personal schedules for all the participants in a network, and can be programmed to use this information to ascertain times when different people are free for meetings. Depending on how much control the user
organization wants to delegate to the computer, meetings can actually be scheduled and entered automatically on the calendars of all participants. On an individual level, the system can be programmed to remind users when they log on of things previously scheduled for the day.

The Prime Office Automation System, introduced in 1980, includes a typical calendaring capability in its software module for "Management Communication and Support." Users of this system cannot access one another's calendars, but can set up meetings by specifying a date and time: the event is not actually scheduled until all invitees have confirmed.

2.5.2 Teleconferencing

Teleconferencing includes both the familiar telephone conference call as well as the use of advanced video techniques to conduct "meetings" between participants in remote locations. The obvious attraction is a reduction in lost time and out-of-pocket expense from physical travel to hold meetings. The technical disadvantage of audio conferencing is the inability to use graphic material and non-verbal communication, while video conferencing involves not only the expense of setting up small television studios in at least two locations, but also the restriction of physical motion by the range of the camera. Various forms of teleconferencing are available on a sort of "utility" basis: AT&T, for example, has studios in several U.S.
cities that corporations can rent for teleconferencing. The
studios are fully equipped with cameras and audio equipment, and
a consultant is available at all time.

Computer conferencing involves the use of a system like
electronic mail to provide the medium for a written dialogue.
"Meetings" consist of queries, responses, and comments, and, like
electronic mail, do not require the participants to be available
simultaneously, although that would obviously be desirable in
cases where quick decisions are needed.

2.5.3 Reprographics

Many of the functions that used to be performed by the
printer or in-house graphics shop are being performed in the
office: photocopying is perhaps the premier example. This trend
is accelerating because of advances in phototypesetting technology
which make it possible for the output of word processing systems
to be typeset without being rekeyed, and because of so-called
"intelligent copiers," which receive word processing output and,
using lasers, print the required number of copies
directly—collated and stapled, in some cases.

Wang is one office automation vendor that markets its own
typesetter that takes output directly from Wang word processors.
"Black box" interfaces are available to convert the output of
other word processing machines into input readable by most
commercially available typesetters. Xerox's newly announced Star
workstation offers a sophisticated terminal graphics and
typesetting capability, with relatively high resolution output on
its Series 8000 electronic printer.

2.5.4 Decision Support Systems (DSS)

This general term refers to any management information
system that is used primarily to assist in relatively
unstructured decision-making situations. BRANDAID, a product of
Management Decision Systems, Inc., is a typical DSS. Designed to
assist brand managers in formulating and implementing marketing
strategies, BRANDAID is a generalized model of the relations
between sales and competition, advertising, economic conditions,
and many other variables; it can be particularized to specific
products and markets, and allows the brand manager to experiment
with different strategies and compare results.

While the field is one of growing importance, and while DSS
can share many resources with the technologies discussed here and
could be considered under the office automation rubric, it is a
fairly specialized technology, in that it supports managerial
decision making, a relatively small part of office activity—or
indeed, of managerial activity. (Mintzberg 1973). For this
reason, and because there is a rich and growing DSS literature
(Keen and Scott Morton, 1978), it will not be discussed further
in this essay.
Chapter 3

INFORMATION TECHNOLOGY AND HUMAN BEINGS

While it is probably true that most managerial decisions in the area of office automation concern the discrete technologies discussed in the previous chapter, there are still some important characteristics that can be ascribed to office automation in general. The most obvious one is the centrality of microelectronics, but there are also some behavioral and organizational effects that relate as much to the whole spectrum of information technologies as to any one in particular. It is important for the manager to be aware of these effects, since they can condition people's responses to the particular technology that is being implemented. In other words, while word processing, for example, has its own unique implications for the organization, it will be perceived by the organization as existing in the context of automation in general, and office automation in particular; these contextual factors may be as important in the success or failure of the implementation as any that are specific to the proposed word processing system.
Although there is a good deal of overlap between them, the following three categories provide a convenient way of considering the organizational impacts of office automation:

1. Automation and employment.
2. Automation and job content.
3. Automation and the individual.

3.1 Automation and Employment

Since the earliest days of the Industrial Revolution, automation of any sort has evoked concern for job security. Whether one takes the view that automation simply displaces jobs from one sector of the economy to another, or the view that automation has created endemic unemployment in the industrialized economies, it is obvious that there is some connection between the introduction of automated technologies and employment levels; there is no reason to think that this connection is not being made by workers in the information industries as they contemplate the future of their jobs.

Many of the standard arguments for office automation rely heavily on the rising cost of clerical work. (Matteis 1979, Poppel 1979). And, while very few vendors and other advocates will put it this way, one logical way to reduce clerical costs is to eliminate clerical workers by automating their jobs. The argument is frequently made that increased productivity through
automation will enable businesses to expand their activities, creating new openings for those who were displaced by the original automation. While this argument is superficially attractive, there are those who question its relevance with respect to the work of information handling. Briefs (1980), for example, notes that

One of the basic wrong assumptions with regard to computerization was that the labour-saving effects could be compensated by the production of "more information" in the "information society." This assumption neglects the basic fact that "information" has to be relevant, has to be connected to actions, to real processes; it probably neglects the other fact, too, that in quite a few realms we have not too little but too much information.

Gilchrist (1980) notes that there have been "periodic flurries of concern" in the United States about the effect of computers on employment. In the mid-1960's many observers felt that a major employment crisis was imminent and could be traced to what was being called "cybernation." (Michael 1964).

Silberman (1967) argued that there was no convincing evidence that such a relationship existed, and indeed concern died down until the technology of microcircuitry multiplied the potential applications of computers and radically reduced the cost of computing power. Whereas the threats of robots and completely automated production facilities in the 1960's proved largely groundless, microprocessors had begun by the late 1970's to make them real again, and brought a new currency to the subject of technological unemployment. Trade unions in Europe, where office workers are more heavily unionized than in the United States,
have done some extensive investigation into the impact of
information technology on office work. (ASTMS 1979, BIFU 1980,
Society of Civil and Public Servants 1980) On a more societal
level, Jenkins and Sherman (1979) argue that in Britain
technology has progressed to the point where massive unemployment
is becoming chronic, and the only answer is for society to change
its norms about the value of work.

Gilchrist (1980), in reviewing the impact of computers on
four U.S. industries, (telephony, telegraphy, typesetting, and
supermarkets) makes the point that employment effects tend to be
selective. Supermarket price code scanners, for example, can
eliminate some relatively unskilled positions, including many
part-time jobs; because of the high turnover in such jobs, the
effect will not be layoffs but a failure to provide job openings,
typically to young, female, and/or minority job seekers. (The
review on which this portion of Gilchrist's article is based
(Gilchrist and Shenkin 1979) notes that about half of all
supermarket employees work part time, so that projected losses of
openings for full time equivalent workers understate the actual
number of people who will be affected. The data that Gilchrist
and Shenkin review indicate a loss of job opportunities in the
supermarket industry for 100,000 people over the next decade.)

Computerized typesetting, on the other hand, tends to
eliminate highly skilled and specialized jobs held by older
workers, frequently white males. Gilchrist (1980) notes that
In all of the sample occupations there is evidence that some new jobs are being created, although in nowhere near the same number as those eliminated. Moreover, the new jobs tend to have considerably higher educational requirements than the ones being eliminated....Few of these new jobs are being filled by the displaced workers.

Shenkin and Gilchrist (n.d.) studied 44 typesetters who were laid off from a New York printing plant that converted to an automated composing room in 1978. They were all men, with an average age of 55.1 years and an average salary of about $22,000. A year after the layoff about three quarters of the sample were working outside the printing trades, often at unskilled jobs. Only a few had found printing jobs, and many were still unemployed. The average income was estimated at less than $11,000.

Printing has a very high proportion of male workers for the occupations that might be thought of as the information and communications trades, however. (This category would include all keyboard related jobs, for example.) Working Women, the National Association of Office Workers (1980), makes the point that the employment effects of information technology are likely to be felt much more strongly by women than by men, since they are over-represented in the office jobs most vulnerable to being automated out of existence: 75 percent of all office machine operators, for example, are women.

While the precise nature and extent of the employment effects of office automation are unknown, it is clear that the employment effects of information technology in general have been
far from universally positive. Job displacement does occur: those who are put out of one sort of work by microelectronics are not necessarily those who find another job that has been created by it. For this reason alone, any automation project will be perceived as having some relation to actual and potential employment levels, regardless of the intentions with which the project is introduced. Managers who uncritically accept the argument that automation will ultimately increase employment need to be aware not only of the extent to which they may be wrong, but of the extent to which they will be disagreed with.

3.2 Automation and Job Content

Advocates of automation over the years have held out the hope that it will make human work more interesting and challenging. Automated equipment in manufacturing can relieve human workers of many repetitive and dangerous tasks, leaving them free to perform work requiring more judgment, or at least a greater variety of tasks. Similarly, the argument is made that office automation takes some of the most repetitive jobs (like retyping standard letters) away from humans, enabling them to focus their energies on tasks of more intellectual content requiring human qualities like reason, tact, and persuasion. However, just as the effect of automation on office employment levels is not all positive, so the application of information
technology can result in jobs that are substantially less interesting and fulfilling than they were prior to automation.

Reduction, rather than enlargement of job scope can be observed in some professional positions. Bjorn-Andersen and Eason (1980) note that

One of the ways in which the information system may cause the organisation to lose the services of human adaptability is in the selection of problems to be dealt with. There is a risk that, having a marvellous tool available which facilitates a particular definition of a problem, people will tend always to define problems in ways which are compatible with the computer.

They then cite a 1977 study of design engineers that indicated that they were considering only solutions that had been generated "within the logical systems offered by their computer evaluation models."

But the reduction of job scope is perhaps more notable in clerical positions. For example, Mumford and Banks (1967) point out that many bank clerks derive a great deal of job satisfaction from the fact that they either have significant contact with customers or could very easily assume positions where they would have. However, the trend toward automated teller stations means that there will be fewer such customer contact positions, with the result that fewer clerks will have opportunities to exercise human relations skills.

Driscoll (1980) notes a trend in office automation implementations toward two classes of employees, "bosses" and "garbage collectors." The former make all the decisions and
policy judgments that the machines are not capable of; the later do all the trivial and fragmented tasks that it is too difficult or expensive to have the machine do.

Many workers feel that, as in the Industrial Revolution, humans are becoming machine tenders. There are some manufacturing operations, typically those involving hand/eye coordination, that are part of automatable sequences but that are themselves difficult and expensive to program machinery to perform, although they are not particularly challenging to a human. Human workers in these situations find themselves reduced to being the machine's helpers. Similarly, there are office tasks, like entering data from handwritten forms, that are currently unautomatable portions of sequences that are for the most part capable of mechanization. Clerks who might previously have handled large portions of a transaction originating from a handwritten document now find themselves "data entry clerks," their function being the single one of making information machine-readable.

Many interactive computer systems reinforce this sense that the human is working for the machine in a variety of ways, ranging from arrogant error messages when data has been entered incorrectly to widely varying response times, which force the job to proceed at the machine's pace, not the human's. The effect of these technical features, however, is probably a less significant determinant of office worker's responses to automation than the
ways in which jobs are structured in the automated office. As Hutton (1972) notes, "the key to all is the design of jobs in relation to whole tasks, the concomitant changes in work layout and control, and the explicit reckoning with the realities of human resources rather than the assumption that people are really a rather awkward necessity, the more awkward when they do not behave like machines."

3.3 Automation and the Individual

In addition to these general effects on employment and job content, automation has impacts on a number of areas relating to the physical and psychological nature of the individual; these areas are frequently spoken of as "human factors," defined by Galitz (1980) as involving "systematically applying knowledge of people's sensory, physical, intellectual and motivational attributes to the design of the equipment, software, tasks, documentation and environment of the office." While each of the individual office automation technologies raise slightly different human factors considerations, there are some common elements of the technologies that affect their users in the same ways. Galitz classifies these elements in the following way:

- Systems design: includes definition of human and machine activities.
- Human/machine interface: particularly hardware.
- Information transfer: content, amount, and structure of information, ways of collecting and transmitting data.
- Documentation: all printed material relating to the system.
- Training: formal and informal.
- Environment: physical workplace conditions.
- Personal factors: traits affecting performance, including motivation, education and skills, age, cognitive style.

It is clear that any automation project, whether in a manufacturing or an office setting, can be considered in relation to these seven elements. The human factors approach holds that there are normative standards for each of these areas, and the systems designer and implementor who ignores them risks inducing suboptimal performance in the users of the system. (Since research in many of these areas has only recently begun and is still inconclusive, these standards are frequently somewhat tentative. Galitz calls his standards "guidelines," and the interested reader is referred to his work for a more complete discussion.)

Environmental and human/machine interface problems in office automation have come under increased study in the last few years, particularly with regard to the VDT, which is becoming the most widely used device for inputting and manipulating information. Concerns about VDT safety have been raised in four areas: radiation effects, including permanent eye damage; non-permanent
eye damage; skeleto-muscular strain; psychological stress
symptoms.

The evidence on radiation has been largely inconclusive
(NIOSH 1977), but there is fairly convincing evidence that
eyestrain and other temporary vision problems can come from
continuous close attention to the VDT screen, particularly if it
is subject to glare from room lighting (TNG 1980). Most VDTs are
operated on furniture that was not designed for them:
conventional tables and desks. As a result, the particular
requirements of VDT operation (closeness to the screen, constant
eye movement from the screen to hard copy, etc.) usually force
the operator to make the necessary accommodations with his or her
body, which can result in substantial strain. The fact that many
VDTs are manufactured as a single unit, without a detachable
keyboard, also limits the adjustment that the operator can make.
(Bergman 1980).

Some of the issues of systems design will be touched on in
the discussion of sociotechnical systems analysis in the next
chapter, but it is clear that where many systems founder is in
their inability to support non-technical users in Galitz's areas
of information transfer, documentation, training, and above all,
personal factors. Ostberg (1975) observes:

In the "childhood" of computerized offices, all
operators were selected, highly trained, highly motivated,
and willing to live with consoles, computer languages,
services and operating procedures that were anything but
optimal from an ergonomics point of view....This was all
very well as long as the operator population was as it
was.

But today's nonspecialist operators...are individuals whose training and interest are in other areas than computer technology. Furthermore, computerization has also made the operator tasks highly specialized and routinized....The impact of this ergonomically "unguided development" has been that clerical computer terminal operators sometimes are more alienated (i.e., lacking job involvement) than shop-floor assembly-line workers....This in turn has implied that even minor faults in the design of the work and the workplace contribute to performance declines and operator fatigue.

Finally, in one way or another most of the office automation technologies alter to some degree a user's opportunities to obtain satisfaction along some critical psychological dimensions like the needs for privacy and for social involvement. Typically, an office automation system will interpose itself as the mediating element between people. This is explicit in electronic mail and teleconferencing, but implicit in word processing as well. But at the same time that it thus acts to separate people, it also is likely to be keeping flawless track of the individual, removing an important element of privacy and autonomy; this is a danger, for example, in word processing systems that keep automatic track of lines produced per day and other operator statistics, or in electronic mail systems, where one would not have to be overly paranoid to wonder about the degree of confidentiality of one's communications.

To the extent that office automation is approached as a way to rationalize office operations, in the scientific management sense of "rationalize," it will come into conflict with the human propensity toward non-standard ways of behaving, ways which are
not only expressive of human-ness, but which, in their ability to generate creative solutions to new problems, sustain organizational evolution. As Driscoll (1979) points out, "if any work organization follows all of its routines all of the time, chaos ensues." So from the point of view of personal impact, the challenge in office automation implementation is to standardize only as much as is necessary for the electronics to work, and then only in ways that do not ignore the characteristics and needs of the human beings who are to run the system.
Chapter 4
ORGANIZATIONAL THEORIES

There is a large body of social and psychological theory that is in one way or another relevant to an academic consideration of office automation as an organizational issue. The question is whether this theory is at all useful to managers in their attempts to introduce information technology into the office.

Mumford (1980) offers two related arguments for an explicit use of social theory in the implementation of information systems. First, she argues that all guides to the design of computer systems contain some implicit theory, and it can be argued that faster progress would be made in developing useful methods and taxonomies if these underlying theories were made explicit and their validity examined and discussed. If theory is not made explicit then the assumptions behind current practices remain hidden and may not be recognized as false.

Second, and of perhaps more importance to managers, she notes that without an understanding of theory, all practice is empirical and generates no useful understanding of why one approach or another worked or didn't work.
My purpose in basing this essay on several strains of organizational theory is more in line with Mumford's second argument than with her first. While in principle it is difficult to quarrel with the idea of developing useful methods from valid theory, it is far from clear that our knowledge of how offices work is complete enough to form a theory against which assumptions can be judged true or false. Nevertheless, the use of a theoretical framework to expose and explain the assumptions hidden in systems design is clearly useful. Sirbu (1980) gives an example in his analysis of an electronic mail system that, in restricting access to outside services like Mailgram to relatively high levels of the organization, betrays a commitment to McGregor's Theory X. This example seems to me to support Mumford's second argument for examining theory: the analyst who looks at this system from the theoretical perspective of "managerial assumptions about human nature" (Schein 1980) will have an understanding of the kinds of resistance that might be generated by the system, an understanding that might not be granted to a more empirical analyst who simply observed that people were complaining about having to get their supervisor's permission to send a Mailgram.

What I am trying to do in this essay is to examine some theories of organizational design, behavior, and analysis that I believe are not only complementary to one another, but that I think have some direct bearing on planning for office automation.
I am not attempting to synthesize these theories into one universally applicable framework for the organizational analysis of office automation, but rather to propose them as a related set of perspectives that may be selectively useful in understanding specific situations.

4.1 Sociotechnical Analysis

Sociotechnical analysis had its origins in the studies of British coal mining done in the early 1950's by Eric Trist and colleagues from the Tavistock Institute in London. These studies were done following the introduction of a new technology that broke up the existing group structure of the miners and imposed a new social organization. (Schein 1980). The seminal finding of these studies, from a theoretical perspective, was that it was useful to consider any working environment as consisting of two subsystems: the technical subsystem, which includes the machinery and the processes for transforming inputs into outputs; and the social subsystem, consisting of the formal and informal social structures that exist among the people in the workplace. These subsystems interact, of course, and each can either support or work against the other. The goal of sociotechnical analysis is to maximize the efficiency of the organization as a whole by bringing the subsystems into a reinforcing relationship.

Taylor (1975) gives a succinct summary of the sociotechnical
approach to designing a work system. First, the boundaries of the "total work system" are established; that is, "the boundaries within which the product is converted from a raw material to an end result." Then, within those boundaries technical system analysis starts by identifying "unit operations" or phases in the work process--the transformation from input to output--in which there is an identifiable change in the state of the input: a sheet being ironed and folded would be a unit operation within a hospital laundry, for example. Variances that can occur in each unit operation are identified (e.g., dirty sheets arriving at an ironing station), along with the effects these variances can have on other variances and on the system as a whole. These variances are arrayed in a matrix to show their interrelationships, which may suggest ways in which either the technical system or the social system or both can be altered to control the variances.

The social system, which is "the coordinating and integrating buffer between the technical transformation process and the demands and constraints of a turbulent environment," is analyzed along several dimensions: internal and cross-boundary role networks (who interacts with whom inside and outside the system); and individual role perception (what do role occupants see their roles to be). Finally, the analyses of the technical and social systems are considered jointly and the design of the system "proceeds by recombining the elements such that the key
variances are controlled by utilizing, to the full, the coordination capability of the members of the work system." By pushing responsibility for coordination as far down the structure as possible, supervisors are free to devote more attention to managing the boundary between the system and its environment.

Cherns and Wacker (1978), argue that sociotechnical analysis tends to be much more explicit and detailed in analyzing the technical systems than the social systems, with the result that "we are able to specify in considerable detail the requirements that the technical system of an organization places on its social system, but we have no adequate way of describing that social system, let alone identifying its characteristics." The approach that Cherns and Wacker propose as a remedy is based on the four basic functions that Parsons (1960) claims must be performed by any social system: goal attainment, adaptation, integration, and latency or pattern maintenance.

The goal attainment subsystem is that set of structures which allows a system to produce goods and services. Adaptation is the process whereby the system responds to changes in its environment so as to achieve its goals. Integration is the process whereby the activities of individuals and groups are combined into directional system activity; thus it involves the resolution or containment of conflict. Latency (pattern maintenance) is concerned with the filling of roles in the system, ensuring the supply of people with the knowledge, skills, and motivations required to perform the roles.

Cherns and Wacker then discuss various analytical tools as bearing on one or another of Parsons' functions. (The sociotechnical analysis of unit operations, for example, relates
to the goal attainment subsystem.) In this way the analyst can use whatever tools seem particularly useful in a given setting, and yet still be able to place the results in a universally applicable framework for system analysis. Finally, dividing the social system into four subsystems makes it possible to isolate and analyze the effects of variances, just as was done in the technical systems analysis described above.

Taylor (1975) reports that by far the majority of cases of work system restructuring based on sociotechnical analysis have occurred in manufacturing environments, with only 9 percent in white collar work. He does not speculate on the causes of this imbalance, but we might suppose that the relatively less clear distinctions between technical and social systems in offices might be a factor. Nevertheless, Mumford's studies of computerization in clerical environments (Mumford and Banks 1967, Mumford and Ward 1968, Mumford n.d.) have long suggested that sociotechnical methods can be applied to information handling workplaces, and a recent major study of computer systems in European banks (Bjorn-Andersen et. al. 1979) confirms this. In this study the researchers used sociotechnical theories, among others, to generate a series of hypotheses about the design process used to create new computer systems in banks and about the effects of these systems on work organization and job satisfaction of clerks. (In general they found a tendency to consider systems design as a purely technical problem calling for
the use of experts; they also felt that job satisfaction, though not an immediate problem, was likely to deteriorate.)

The sociotechnical school tends to promote three closely related principles:

1. Individual job satisfaction is a critical measure of the success or failure of a work system; while it may be a valid goal in and of itself, it is important because it tends to create a more productive organization.

2. User participation in the system design process is absolutely essential, not simply because it results in better design, but because it is the only design philosophy that is consistent with democratic social ideals.

3. Of all the possible forms of work organization, the autonomous work group—a small body of workers with considerable discretion over work methods—is most likely to maximize job satisfaction and insure that technical and social systems are in congruence.

One may debate the validity of these principles in whole or in part—Bagozzi (1980), for example, has shown that at least among sales people job satisfaction does not necessarily influence level of performance—but they do form a consistent theoretical image against which to compare actual situations. Together with the sociotechnical theory which they exemplify, these principles can serve to focus managerial attention on the interface between the work of an organization and the people who do the work.
4.2 Job Enrichment

The job enrichment movement focuses somewhat more directly than sociotechnical analysis on the question of job satisfaction, and grows out of Herzberg's work (1966; Herzberg et.al. 1959) on motivation. Briefly, Herzberg argues that job factors that lead to high motivation and satisfaction are not simply the opposite of those that lead to dissatisfaction; if employees are dissatisfied by low pay, it does not follow that they will necessarily be motivated by high pay. Instead, Herzberg isolated a set of qualities which, if present in a job, will prevent dissatisfaction, and a set which will actively promote satisfaction; these are called, respectively, "hygiene" and "motivational" factors. Job enrichment analyzes the content of jobs with reference to the motivational factors (recognition, advancement, responsibility, challenge), and pays less attention to hygiene factors:

This is not to say that other factors in the work situation, such as pay, supervisory style, fringe benefits or working conditions do not account for some variance in performance. It is simply to say that of all of the factors job design [with respect to motivational factors] is the one that accounts for more of the variance than any other single factor. (Whitsett 1972)

Job enrichment, according to two British practitioners (Paul and Robinson 1970), "crosses the old frontiers between work study and welfare-style personnel work."

It rejects the inevitability of a win-lose conflict between task efficiency and human satisfaction and postulates instead an interplay between the two. Neither task boundaries nor people's attitudes are accepted as a
given constraint: both are held to be open to change in a related way.

In a sense, then, job enrichment could be seen as an attempt to focus the two systems concerns of the sociotechnical school on the individual worker, but there is a significant difference in that the primary unit of analysis is not the system's task but the worker's job, and the human concerns relate directly to the individual, and not to the individual through the social system of the workplace.

Lawler and Hackman (1971) identify four key characteristics of an enriched job, which they call "core dimensions":

1. **Variety.** The degree to which a job requires employees to perform a wide range of operations in their work or to use a variety of equipment and procedures on the job.

2. **Autonomy.** The degree to which employees have a major "say" in scheduling their work, in selecting the equipment they will use, and in deciding on procedures to be followed.

3. **Task identity.** The degree to which employees do an entire or "whole" piece of work and can clearly identify the results of their efforts.

4. **Feedback.** The degree to which employees as they are working receive information which reveals how well they are performing.

These characteristics are sufficiently general that job enrichment techniques can and have been applied to a variety of jobs, whether manufacturing, service, clerical or administrative. Janson (1979) offers an example of a job enrichment project in an insurance company office of 75 people who handled billing and
other policy holder services. As the workplace was structured prior to intervention, there were three types of jobs: change coding, which handled and coded incoming documents and mailed out bills; payment recording, which involved maintaining customer records; and special clerks for non-standard situations. The restructuring involved collapsing all three functions into a single new job; these "account analysts" were then responsible for all phases of work relating to a smaller subset of the customers. As a result, productivity improved as measured by case load per person, service improved, and employee satisfaction increased.

Job enrichment became a very popular topic in the late 1960's and early 1970's, as attention was focused on perceived worker discontent with the quality of worklife—the so-called "blue collar blues." Not surprisingly, critics arose who pointed out the limitations of a naive belief in job enrichment, particularly if it involved obliviousness to Herzberg's hygiene factors. Fein (1974) reviewed much of the job enrichment literature and found the case evidence unsatisfactory. In some instances the reporting did not square with the facts, or omitted critical details: an HEW report on a much-cited project involving janitors at Texas Instruments did not mention that, along with having their jobs restructured, the janitors received 46 percent pay increases. In general, Fein noted, there were few cases reported on, relative to the amount of enthusiastic talk,
and most of them involved handpicked employees in isolated operations. There were no reported instances of job enrichment projects involving large numbers of employees in large, integrated operations. Finally, he observed that job enrichment projects seemed always to be initiated by management, never by workers, unions, or other interested parties, and cited William W. Winpisinger of the Machinists:

In my years as a union representative and officer I've negotiated for a lot of membership demands....But never once have I carried into negotiations a membership mandate to seek job enrichment. In fact, quite to the contrary, working people want management to leave their jobs alone.

Job enrichment, then, can be perceived as simply a way for management to get more out of workers without having to pay them for it. Fein argues forcefully that "the intrinsic nature of the work" is, for most workers, subordinate to pay, job security, and job rules as a source of satisfaction, and that job enrichment programs that do not address those concerns are likely to be met with suspicion, hostility, and resistance.

A sophisticated awareness of job enrichment theory—that is, one that does not ignore the importance of hygiene factors—can be very useful in thinking about the structure of automated office work. Some of the early models of word processing, for example, could have benefitted from such an awareness. Instead of rigidly insisting on a strict separation of typing from "administrative support" activities, these models might have recognized the desirability of using word processing technology
to support the performance of complete tasks by a single worker: setting up a committee meeting in addition to typing the agenda and minutes. As office automation technology grows more flexible and supportive of task integration, job enrichment theory becomes even more valuable.

4.3 Office Analysis Methodology

Office Analysis Methodology (OAM) is a formalized approach to the analysis of office functions currently being developed by the Office Automation Group at MIT's Laboratory for Computer Science. It is a technique of study that yields a description of the way an office works, couched in standardized terms, thus making analysis easier and facilitating comparison of offices. The Office Automation Group is also developing an Office Specification Language in order to describe office functions unambiguously. (Hammer and Kunin 1979).

The basic principle of OAM is to approach the office functionally; that is, in terms of the business purposes it is intended to support, as opposed to simply the operations (typing, filing, telephoning) that go on within it. While OAM is intended to be purely descriptive and does not prescribe specific technologies, it "is oriented towards the development of integrated functional support systems."
By this we mean systems that support in an integrated fashion the whole range of procedures and decisions that, taken as a whole, achieve a particular business goal. Such systems are more sophisticated than the usual word processing center or electronic mail facility; they seek to automate those aspects of office operations that can be automated and to integrate the system's components into an effective and flexible support environment for the office staff. (Sirbu et al. 1980)

While OAM comes from a systems analysis tradition and is clearly oriented toward the development of large, comprehensive, and integrated systems, it differs from more traditional data processing approaches to office analysis in its focus on functions, not tasks, and on the semi-structured nature of most office work, with its continual demands for human decision-making even in many relatively routine operations. Although it shares some features with sociotechnical analysis, OAM looks at the office as a single system, not as a linkage of equal subsystems; it is clearly distinct from job enrichment in that it does not directly concern itself with the content of individual jobs.

OAM works with several units of analysis, of which the function is central: "An aggregate of all the detailed activities that collectively manage and maintain some resource that relates to the business goals of the larger organization." (Sirbu et al. 1980). Resources, in this usage, are the materials on which the office operates, not the tools that it uses: the employees of an organization, for example, are the resources of the personnel office. Each function can be broken into temporal stages (initiating, managerial, and terminating)
and procedures, which relate to the manipulation of objects; objects are either physical (reports, forms) or real but intangible (requests for funding, etc.) (Objects might be thought of as the sum total of the unit operations in sociotechnical analysis.)

While the terminology may seem forbidding, the actual analysis is fairly straightforward, being founded on the belief that office activities are, at the core, fairly simple, with complexity arising only in exception-handling routines. The analysis begins by identifying the office's context, its functions, and its resources. Once the procedures and objects that relate to the functions and resources are also isolated, the procedures can be described, beginning with the ideal state, and then encompassing the exceptions. A parallel analysis is made of the formal and informal databases that office workers use to perform procedures, which may include telephone directories, price lists, or all the things that one simply "knows" in order to do a job. The analysis concludes by writing up the results in a standard format. For examples of OAM applications, the reader is referred to Schoichet (1980), Zarmer and Schoichet (1980), and Zarmer and Kunia (1980).

OAM could be a valuable managerial tool even if there were no intention of automating, in that it forces managers and office personnel to think systematically about the business purposes of the office; it helps prevent getting lost in a thicket of
detail. This is also its primary virtue in assisting the implementation of information technology. It frees the analyst from thinking in terms of enhancing existing manual practices and encourages the development of ways to use technology more comprehensively and take advantage of whatever inherently integrating powers it has. Finally, while one may disagree with specifics of terminology and emphasis, OAM promises to provide an efficient and relatively inexpensive way to catalog the activities of the office, which is a necessary first step to implementing any technological change.

4.4 Planned Change Management

In a sense, the phrase "planned change management" describes what managers do in the normal course of events, not a discipline in the applied social sciences. The processes of thought and action by which one gets from today to tomorrow with one's organization intact could be said to constitute the management of planned change. However, the term has come to be applied in a more restricted and, for our purposes, a more useful way, to describe a body of organizational thought and practice in which the techniques of the behavioral sciences are applied to the active management of large scale changes in organizations. ("Organizational development" [OD] is sometimes used in the same way, but I feel it is a somewhat vaguer and less directly
In contrast to OAM or even to sociotechnical analysis, planned change management encompasses an extremely wide variety of different approaches. Moreover, although the discipline is fairly young, there have been some significant changes in emphasis. Huse (1975) summarized the basic characteristics of planned change management, or OD as he called it, that Bennis, one of the pioneers of the field, had identified only six years earlier; most of them had undergone major changes. Bennis, for example, felt that OD "is an educational strategy intended to bring about planned organizational change....The focus is primarily on the attitudes, relations, and organizational climate rather than on the goals, structure, and technologies of the organization." Huse notes that increasing attention has been paid to organizational structure and technologies as variables in the change process, and that purely educational strategies are less common.

Beckhard and Harris (1977) see this shift away from human resource development as being central to the current practice of planned change management, which has more of a systems focus and rests on "the view of an organization as a complex set of interdependent subsystems—people, structures, technology, tasks—which are embedded in a dynamic environment and [on] recognition of the need for developing and maintaining compatibility among these subsystems." Beckhard and Harris also
note an increasing awareness of the importance of the "transition state," the period of organizational development between the present and the desired future state.

Although the techniques employed in planned change management vary with the practitioner and change over time, some fairly consistent themes can be seen in the literature. Four stand out in particular:

1. Heavy involvement in preliminary analysis and diagnosis.

2. Use of an internal or external "change agent" or consultant working in collaboration with a member or members of the client organization.

3. Use of a wide range of behavioral and organizational tools.

4. Attention to the change process itself, as opposed to simply the attainment of goals.

Beckhard's approach to planned change management (1969; 1975; Beckhard and Harris 1977) is only one of many, but it illustrates these four themes very well, and provides a model that is particularly useful for implementing office automation.

Beckhard begins, as do most practitioners, by looking at some initial problem or issue that has caused the organization, or a specific person within the organization, to contemplate change. However, the diagnostic phase does not assume that solving this problem is necessarily the appropriate response: it may simply be a result of conditions prevailing elsewhere in the organization. One purpose of diagnosis, then, is to identify all
the subsystems related to the initial problem, and through this process to define the "change problem." (See Figure 1.) This change problem:
conflicting lines of authority

related problem:
paperwork backlog

related problem:
inefficient communications

initial problem:
late deliveries

Figure 1
Typical relationship between initial problem, related problems, and change problem
definition process includes locating the appropriate "organization change" (e.g., work structure, reporting relationships) and the "type of change" involved (e.g., of attitudes, behavior, knowledge and understanding, organizational procedures, or of actual work methods).

The closely related second step is to determine the degree of readiness and the capability to change within the relevant systems. Readiness for change is a function of the level of dissatisfaction with things as they are, the clarity with which a better state is perceived, and the costs of changing. Capability to change relates to the control of resources necessary to bring about change. Not infrequently parts of the system that show readiness do not have the capability to bring about the change;
part of the consultant's diagnostic task is to find a point in the system—if indeed one exists—where there is both readiness and capability, or to help generate strategies to produce whichever is lacking.

In Beckhard's model, as in many others, the consultant or change agent is a critical actor whose role in the change process needs to be carefully examined. Because an outside consultant is likely to be perceived as speaking in general with authority, "it is necessary for the consultant to be clear with himself and with the client about what knowledge and skills he brings to the problems and what knowledge and skills he does not have."

(Beckhard 1975)

This is critical even when the consultant does not function as an expert giving advice, but as a collaborator with people inside the organization, whose role is to ask questions that lead to a solution. It is critical because the consultant becomes part of the change process—indeed, the fact that a consultant has been introduced indicates that the change process has begun—and his or her own attributes and motivations are a part of the change problem that must be understood.

While part of the diagnosis state involves identifying an ideal future state for the organization, this is unlikely to be a state that is immediately attainable. Accordingly, identification of intermediate change strategies and goals is the next step. At this point, the consultant may well act as more of
an expert, insofar as these intermediate stages may involve the use of specific behavioral science techniques that the members of the organization are not aware of. If, for example, the ideal state of work organization for a utility's billing department included giving customer contact responsibilities to clerks who had previously had only record-keeping duties, an intermediate stage might be to design and implement a communications skills workshop for the clerks. At the same time, their supervisors might need additional training in delegation of authority. Part of the consultant's role is to act as a resource when such intermediate needs have been identified and be able to help the organization use whatever behavioral and organizational tools are appropriate.

This identification of intermediate goals serves to emphasize the contention that "rather than thinking of the time between the present state and some desired state as a period during which a plan must be made, it should be thought of as a state of affairs in itself, requiring a governance or a management structure and specific work plans and controls unique to that state." (Beckhard and Harris 1977).

Planned change management is particularly relevant for office automation because of this emphasis on the transition process; indeed, the example that Beckhard and Harris use to illustrate the separate existence of the transition state is drawn from a computer application in an accounting area. The
relevance comes from the fact that office automation implementations typically take place over extended periods of time, during which many procedures are neither fully automated nor fully manual, and in which issues of an introductory nature—personnel training, delivery of supporting pieces of hardware and software, etc.—are likely to be dominant.

The emphasis on understanding the nature and role of the change agent is also relevant, since one person, or at most a small group, is typically seen within the organization as being a catalyst for change. Self-awareness on the part of such individuals, and a recognition that they are a part of the process they are trying to direct, can lead at best to a skillful use of the self as an instrument of change, and at worst to an avoidance of blunders.

Finally, planned change management raises the question of forces that act in favor of change and forces that act against: in Beckhard’s model, as a part of the assessment of system readiness and capability for change. As the next section on political analysis will go into in more detail, this sort of "force field analysis" (Lewin 1951) helps the implementor of office automation to consider not just the technical merits of the proposed system, and not just the individual impacts, but the context of organizational power in which he or she is operating.
4.5 Political Analysis

Although the adage "information is power" has been in use for a long time, it is only fairly recently that students of information systems have begun using tools closely associated with the analysis of institutional power. Keen (1980) and Markus (1980), of MIT's Center for Information Systems Research, have begun applying a political perspective to the implementation of management information systems (MIS).

The focus of this research is the problem of resistance to attempts to implement an MIS. Resistance is usually thought of by systems designers as a reflection of ignorance or irrational bias on the part of the reluctant users, to be countered by education and communication, or by executive fiat. Political analysis, on the other hand, sees resistance as a function of the clash of interests within a pluralistic organization. Keen (1980), taking issue with the sort of single-minded firm assumed by microeconomists and many MIS developers, asserts that "most case studies of complex decisions suggest that companies are far more pluralistic than we conveniently assume."

Pettigrew's (1973) analysis of a decision to purchase a computer, for example, reveals innumerable territorial disputes, maneuvering for position, conflict over goals, and irreconcilable differences in perspective among organizational units. Believers in pluralism do not find that surprising. Most computer specialists do.

The essential point about resistance is not to overcome it but to understand why it exists and to work with it and, ultimately, around it. In Keen's view, there are in relation to
information systems four principal causes of "social inertia," which might be thought of as the sum of all resistance to change in an organization, active and passive, conscious and unconscious:

1. Information is only a small component of organizational decision processes;

2. Human information-processing is experiential and relies on simplification;

3. Organizations are complex and change is incremental and evolutionary; large steps are avoided, even resisted;

4. Data are not merely an intellectual commodity but a political resource, whose redistribution through new information systems affects the interests of particular groups.

If an organization typically makes decisions largely on executive instinct, processing information by radically simplifying it and measuring it only against information used in comparable decisions made in the past, and an information system is proposed that will involve a major change in the way decisions are made and new demands on managerial time, then social inertia will be strong. If, on top of that, the proposed system will change the distribution of significant information within the organization—by making low level divisional accounting records easily available for corporate inspection, for example—then active resistance is likely.

Elaborating on Keen's fourth point, that data are a political resource, Markus (1980) argues that the design of an information system affects the way power is distributed by the
way it allocates information that permits coping with uncertainty, which she sees as the key determinant of organizational power. The power distribution inherent in the information system is unlikely to be precisely the same as that within the organization to begin with; hence, in the course of implementation people are likely to use the system in ways that will distribute power more to their liking:

These intervening reactions and behaviors might be labeled resistance.... {I}n the political perspective,...resistance is not an outcome that is good or bad, successful or unsuccessful, in and of itself; it is important because it determines whether the power distribution implied in the design of an information system will be realized when that information system is used.

The political perspective assumes that the impact of systems is not inevitable, but depends to some extent on the choices that people make about using it.

The available choices, of course, range from enthusiastic cooperation to outright refusal to use the system; the strength of the political perspective is its ability to provide a rationale for behaviors that are in between these extremes, like providing the system with inaccurate data, using it inconsistently, etc.

Markus applies political analysis to two case studies of large system implementations, and finds that it explains behaviors during and after implementation better than two competing explanations: technical problems with the systems, and inadequate user participation in design. She suggests, however, that some organizational situations lend themselves more readily
to political analysis than others, in particular "when the information system cuts horizontally across a large number of diverse subunits and has many different types of users."

In office automation studies, then, a political perspective may be useful when the proposed project involves communication across unit boundaries, as in many electronic mail systems, or involves the sharing of an information resource like a central electronic file accessible by more than one organizational unit. Even within a unit, political analysis can shed some light, if there are recognizable subgroups whose power the proposed system will affect in different ways. A centralized word processing system, for example, may be susceptible to political analysis if its introduction changes patterns of access to the informal information flows in the office, creating power differentials between operators isolated in the center and secretaries left in traditional administrative support roles.
Chapter 5

USING THEORY: NEED ASSESSMENT AND PLANNING

While I hope that this essay would prove useful to managers concerned with existing office automation systems, I have chosen to approach the applications of theory using the chronological order that one would attach to the introduction of a new system. Such an ordering encourages a more inclusive scope and presents the material in a more systematic way. Moreover, at this point change is a more common state than rest in the office automation field, and the introduction of new systems is close to a universal problem.

5.1 Need Assessment Issues

5.1.1 What is the office or organizational unit in question and what does it do?

While no one, surely, would implement office automation without asking these questions in at least a cursory way, the nature of the office under study and the functions it performs are issues worth a great deal of time and attention. There is
little point in, as the expression goes, "automating a mess" if, through understanding the office and the work it does, the mess can be rationalized and automation brought in to support a better-designed work system. Similarly, technology may make possible new types of work organization that will be effective only if the basic function of the work group is understood; electronic mail, for example, may enable a radical decentralization of a regional sales force, but such a change should be made only if the nature of the work is such that decentralization is an effective strategy.

Even in cases where no reorganization is contemplated, the technology introduced may be of the wrong sort, the wrong size or configuration, its support may be inadequate, and its operation frustrating and inefficient, unless sufficient attention is paid initially to the office and the implications of the work it does. For example, a word processing center in the planning office of a major corporation inherited telephone dictating units from the corporate development office when that group was folded into planning. The corporate development office generated a lot of short correspondence, for which IBM dictating units with 6 minute recording discs were ideal. The planning office, however, produced long reports, and analysts were frequently frustrated by the difficulty of dictating onto very small discs—principally because it was impossible to return to a previously recorded disc to review the material on it.
However, if the need for understanding the nature and function of the office is relatively clear, how to achieve that understanding is not. Is "the office" a collection of people, an organizational subunit, a geographical location? Does it produce concrete things like personnel requisitions or sales reports, or does it perform more abstract services like monitoring and approving human resource changes, or judging the effectiveness of sales efforts? How the office is defined reflects directly on how automation will be introduced into it, because different perceptions of what an office is and does will result in different approaches to technological enhancement.

Obviously, there is an enormous amount of work in the social sciences that bears on the definition and characterization of groups like offices. The challenge to the manager is to find an analytic approach that is sufficiently sophisticated to identify all the relevant complexities of the office, but still be accessible in a practical way to the layperson. Office Analysis Methodology (OAM) and sociotechnical analysis, discussed in the previous chapter, are two such approaches. Both, it will be recalled, seek to define the work group in terms of the functions it performs, but they differ significantly in the way that they identify organizational issues within the group.

While OAM does not explicitly address behavior issues, one of its critical insights is to draw a distinction between routine work handling and exception handling. This has important
implications for the design and implementation of office automation.

Consider, for example, the medical records library of a hospital, which stores records of patients after discharge and makes them available to doctors for follow-up outpatient visits or other purposes. The handling of records that are completed—i.e., that have all the required physicians' notes and signatures, medication and test records, etc.—is fairly routine and represents a major portion of the workload. The handling of records in the process of completion is more difficult: they must be made available when needed, but must also be handled as items in progress and given to doctors to review before the dictation of operation notes, and so on. An indexing and information retrieval system must take into account not only the two types of records being handled, but the types of job issues they imply: should all clerks be responsible for retrieving all records, or should a specialist be assigned to those in the process of completion, retrieval of which may require detective work and contact with personnel outside the records library? By focusing on the distinction between routine procedures and exception handling, the OAM approach calls attention not simply to technical systems design issues like building a medical records index, but also to job design and other organizational issues.

Sociotechnical analysis, of course, focuses much more
explicitly on the interconnectedness of technical and organizational issues, by defining the office as a set of parallel systems. While a thorough-going sociotechnical analysis of an office may be infeasible, the kind of awareness that the approach gives is invaluable. In one large government agency, for example, office automation specialists tried to have a very complex, paper-bound system for issuing travel authorizations streamlined and handled entirely electronically. What they ran up against, however, was the fact that the people who handled the authorizations had a very strong, if amorphous social system that placed a high value on the physical presence of an approval stamp on authorizations and the aura of control that it conferred. As one analyst put it, "the problem was always bigger than anybody we took it to." The procedure was not automated.

5.1.2 Is there a particular problem in the office that automation is expected to solve, and if so how can it be defined organizationally?

While office automation is generally introduced as the answer to some problem, this is not necessarily the case; an automated technology may appear even in the absence of any perceived problem. In the case of the planning office mentioned in the last section, telephone dictation was introduced more because the equipment was there than because of any perception that text originators needed this support. However, this is an
unusual set of circumstances, and even so, the solution can come
to generate its own problem ex post. In this case, some analysts
did come to see dictation as the answer to an inputting problem
they had not previously realized they had.

More frequently, though, office automation will be turned to
as the solution to some problem, whether a general one, like
apparently low clerical productivity or poor customer service, or
a specific one like slow turnaround on routine correspondence.
It is obviously critical that those responsible for the design
and introduction of an office automation technology understand
what the problem is that they are supposed to be solving. It is
equally important—indeed, part of the process of definition—to
know whose problem it is, to recognize all the people for whom a
given situation is a problem, and to understand the different
ways in which they perceive the problem.

The generation of routine correspondence by a company's
employment office might be a good example of the sort of
situation with multiple problems that may seem at first to be one
problem. Assume that there is a generally shared perception that
letters acknowledging receipt of job enquiries could be processed
more quickly than they are. The head of the personnel function
might see the problem as the loss to the company of potentially
valuable employees through careless handling of their
candidacies. The office manager in charge of the location where
the correspondence is prepared might see the problem as one of
scheduling these letters among the other clerical work the office is responsible for. The clerical staff might see the problem as the unattractiveness of typing form letters, relative to other tasks.

The three parties here are looking at the same situation from different perspectives. To use Cherns' and Wacker's terms (1978; above, sec. 4.1), the personnel head is looking at correspondence as a goal attainment function; that is, the letters are in support of the unit goal of hiring good employees. The office manager and the clerical workers, on the other hand, perceive the problem as belonging to the sphere of integration, the internal management of resources. The point is not to attach labels, but to recognize that these different perceptions of the problem may dictate very different solutions.

The personnel head might want to solve his or her problem by dispensing with letters altogether, except as follow-up to telegrams or phone calls, in which case rapid production would be of less importance. The office manager might want to deal with the problem by hiring a specialist to produce the letters, or by assigning an existing typist to that task exclusively, and bringing in a stand-alone word processor to be dedicated to support. The clerical workers' preferred solution might be to keep the letter writing as part of everyone's job, but to give everyone a word processing terminal to lessen the drudgery.

It is unlikely that multiple solutions would be adopted:
give everyone a terminal but assign one typist to the task but handle it all by telephone. So assume a unique solution, say a small centralized word processing center. Even this solution will be perceived differentially, again depending on the original perception of the problem. The department head is likely to think it is ideal, if the company indeed appears more responsive to job applicants. The office manager may think it is an acceptable solution, except that it makes it more difficult to shift people around to cover scheduling crises. The clerical staff are likely to be split in their opinions, depending on whether an individual's job is made more or less rewarding by the change.

5.1.3 Who are the relevant players and what are their motives?

The preceding section made the point that the perspectives of different organizational actors shape their perceptions of problems, which of course affects the solutions that are devised. But recognition of the multiplicity of relevant players and the diversity of their motives is important in more than just the problem definition phase. Any office automation technology is a complex system, involving many different parties—frequent users, occasional users, extra-organizational "clients" of the system, managers with budget responsibilities, and so on. Each of these interested parties, or stakeholders, has some degree of veto power over the implementation of the system—users can refuse to
use it, or if they have to use it can use it incorrectly, managers can refuse to pay for it, etc. The more complex the system, the more the avenues for non-cooperation, and the greater the degree to which successful implementation depends on understanding the motives of all the stakeholders in the proposed automation.

Some of the stakeholders may not be obvious, and their motives even less clear; the head of a department that is *not* introducing automation may be a stakeholder in the actions of one that is, if the success or failure of the implementation will reflect on his or her decision not to automate. Motivations, in this case, are a function of the larger organizational climate.

But even when a stakeholder's identity is obvious, as in the case of clerical staff in a department that is introducing word processing, motives are unlikely to be simple, since they relate not merely to the issue at hand, but to a whole complex of related concerns. As suggested in section 3.1, the introduction of word processing equipment is not just that, but may also be perceived as an example of automation in general, with its attendant threats to job security.

The manager's task, then, is to find some way to think as comprehensively as possible about the affected parties and the motives they have to accept or reject the proposed automation technology. Clearly, common sense will go a long way here, but the techniques of planned change management offer a somewhat more
systematic approach. Beckhard's diagnostic model (Beckhard and Harris, 1977), which starts with the conviction that the initial problem is only a way into a whole constellation of problems, is particularly useful in the way it proceeds by identifying the change problem, then assessing the forces for and against change. Although it will ultimately prove too simplistic, this initial for/against evaluation makes it easy to isolate groups and their interests.

A case in point involves the introduction of a centralized administrative support center (word processing, phone dictation, and telephone switchboard) in the marketing department of a major manufacturing firm. When the center failed to perform to expectations, analysts from the management services group found that one of the causes of a high level of transfer requests from the center staff was that there were actually two groups of secretaries who had been converted into "office support specialists," not one, and that these two groups, separated along age and seniority dimensions, had very different motivations for rejecting the change. The older workers resented giving up the status that their seniority gave them in the traditional office structure, while the younger ones, who enjoyed the new equipment more, resented doing equal work for less pay than their senior colleagues. The response was simply to begin gradually moving the older workers into other positions in the company, and staffing the center with younger workers.
It may also be useful to apply the techniques of political analysis, particularly if the proposed technology affects the distribution of organizational power or resources, or even seems to. One word processing center in a highly politicized multinational corporation was named the "Information Processing Center," even though no computation was done. The reason was that its department, which was corporate planning, wished to establish its right to handle not just words, but budget numbers as well, traditionally the turf of the comptroller's department.

5.2 Planning Issues
5.2.1 How will the system be designed?

As Sirbu (1980; above, chap. 4) points out, even the installation of an off-the-shelf system can reflect strong biases toward one or another philosophy of organization; the early IBM emphasis on centralized word processing is another example of implicit philosophy. When an organization starts from scratch to design an office automation system, it is just as critical to look at the design process and make sure that the organizational values that it implies are understood and are truly those of the organization.

Perhaps the single most important design issue is the degree of user involvement in the design process. While hardly anyone would argue that user involvement is a bad thing, there is still a lot of room for disagreement about who is a user and how they
ought to be included. The question of who is a user gets back to
the identification of stakeholders: both an analyst dictating a
report and a word processing operator transcribing it could be
considered users of the system, but they have very different
perspectives on it and different sets of interests to be
considered in designing it. Similarly, a manager who might not
personally use the system but whose work depends on others using
it, might legitimately be considered a user, again with a
different perspective.

Sociotechnical analysts make a strong case for heavy user
involvement in design. Hedberg (1980), for example, foresees a
future in which all systems design will be fully participative,
to the point where "designer," as a separate role, will not
exist. In part this orientation comes from a philosophical
conviction about the increasing necessity of industrial
democracy, but even without sharing Hedberg's views on this point
one can construct an argument for heavy user involvement based on
the proximity of the users to important information about how
their jobs are done, and on the positive effect that involvement
has on commitment to making the system work.

The freight damage claim section of a small regional
railroad is in the process of changing from using paper claim
forms feeding into a batch entry system to using on-line
terminals for clerks to enter claim reports directly into a
central computer. While most of the information content of the
reports is mandated by regulation, system designers have worked closely with the clerks in laying out the screen format and entry procedures. While this does not reflect the degree of user involvement envisioned by Hedberg, early indications are that it has positively affected acceptance of the new system.

Inherent in the Office Analysis Methodology is a view of involvement contrary to that of sociotechnical analysis: because people typically focus on the details of their jobs as currently constituted, they are only sporadically useful in identifying the larger functions of their organizations. The implicit rationale behind the highly structured OAM description techniques is that an outside agent is needed to sort the forest out from the trees. Users are a valid source of data, both through interviews and observation, but they are not likely to provide useful generalizations for the design of automated support tools.

Planned change management also focuses on the role of the outside intervenor; most planned change literature assumes a critical role for a consultant. But there are critical differences in the role of the outsider. In OAM the analyst is much more like the typical systems designer: he or she gathers data, assembles it, verifies it with the people in the organization, and draws up a description. The purpose of the planned change consultant, however, is not so much to impose an order on data gathered from people in the organization as to ask questions that will cause them to discover that order for
themselves and to help them act on the basis of it. Thus, a key concept in planned change management is "ownership of the problem": that is, much of the consultant's efforts are directed at generating somewhere within the organization a personal or small-group responsibility for understanding the problem and bringing about the desired change. This may be a result of OAM, but it is not necessarily built into the process.

Participation in the design of an office automation technology can be a very powerful way to achieve ownership of the problem; similarly, non-participation can result in a serious distancing. The supervisor of a word processing center in a large financial services company was not consulted on the physical layout of new quarters into which her group is going to move. She felt that the new design, based on clustered work stations, would inhibit the informal communication between operators that enables them to help each other, and impede her performance as supervisor by eliminating most visual cues that individual operators are experiencing difficulties. The new design may or may not have these effects: at the time of writing the move had not been made. What is certain is that her exclusion from the design process made her expect them, and may reduce her commitment to the success of the center in its new location.
5.2.2 Who will manage the implementation process?

One of the major contributions of planned change management is the realization that the period of change in an organization is a discrete stage with its own management needs that are different from those of the pre- and post-change stages. This observation is relevant for all major change activities, but particularly for the implementation of office automation, since implementation usually takes a significant amount of time, involves education in new procedures, and has multiple impacts on the organization that are more or less transitory, in addition to permanent changes in the way work is done.

Some of the most troublesome organizational issues in office automation arise from the process of learning unfamiliar procedures, which may involve relatively high job status individuals taking instruction from lower status individuals and acquiring or using skills associated with lower status jobs. In electronic mail, for example, executives find themselves having to use a keyboard. Dictation training frequently accompanies installation of centralized dictating equipment, to ensure reasonable consistency in dictating style (e.g., what words should be spelled out, how to indicate a paragraph break, etc.) and in the overall operation of the system; this is likely to mean that someone from the clerical ranks is put in the position of training executives in what is usually a highly personalized communications act.
Other transition issues arise when, as is very likely in a complex system, implementation does not go strictly on schedule, and ad hoc decisions have to be made on what aspects of the implementation to proceed with. This may mean that some previously made commitments that helped sell the new system will have to be renegotiated. But whatever the source of the issues, it is certain that during the implementation issues will arise, some of them unexpectedly. Planned change management argues that someone should be assigned a transition management role to deal with them.

Beckhard and Harris (1977) feel that the ideal change manager is someone who:

1. Can have the clout to mobilize the resources necessary to keep the change moving. Usually in such a change situation, one is competing for resources with others who have ongoing work to do.

2. Can have the respect of the existing operating leadership and the change advocates. A great deal of wisdom, objectivity, and linkage may be needed in order to make the balancing decisions, e.g., how much resource to put into the new activity and at what pace.

3. Has effective interpersonal skills. A great deal of the leadership at this time requires persuasion rather than force or formal power.

While this sort of manager might well be able to implement office automation very smoothly, not every organization has such a resource to spare to the task. What many organizations find some success with, however, is having a single person be responsible for coordinating information flows.
regarding the new technology. The systems designers in the government agency mentioned in section 5.1.1 found that implementation proceeded much better once they identified a single person within each user office to be the primary link between the office and themselves, channeling all user questions and suggestions. Commercial Union Insurance Companies' Interactive Services Division, which is responsible for implementing office automation throughout the organization, assigns representatives to each office in which an installation is in place (Commercial Union 1980). These representatives are directly available to users in the offices, and handle all phases of the implementation. The ready availability of information under such a system seems to reduce much of the uncertainty in the implementation of the new technology.

5.2.3 What is the best place to start the implementation?

The easiest place to begin implementing an office automation technology is not necessarily the best. On the other hand, going immediately after the office's most difficult problem area in hopes of a spectacular early victory may not be the best approach either. The question of where to begin is one of the most critical to successful implementation, but also one of the hardest to make useful generalizations about. Again, some of the theoretical approaches we have discussed offer structures for
thinking about the question.

Planned change management is very concerned with finding the best place to begin the change process. While there is no "planned change formula" for finding the right place, there are several classes of candidates that seem particularly useful for office automation: new groups within the organization, where there is no institutional tradition of doing things without automation; "staff systems," whose skills and resources will be used directly in later phases of the implementation; and "hurting systems," where there is an acute awareness of a problem and a readiness to change (Beckhard and Harris 1977).

The hurting system approach may be particularly useful in implementing a new technology in an organization whose overall commitment to automation is low, since solving the hurting system's problem creates a group of advocates within the larger organization. For example, if word processing is first made available to a subsection of an office that has had only minimal secretarial support, enabling it for the first time to get its work typed quickly and well, a beachhead will have been established from which the implementation can proceed.

Sociotechnical analysis offers a different perspective on the problem of where to start. It focuses attention on the key areas of variance, that is, the intersections of social and technical systems where mistakes or inefficiencies become most compounded throughout the organization. A sociotechnical
approach to implementing electronic mail, for example, might begin with linking those parts of the system where quick but non-telephonic communication would reduce the possibility of malfunctions in the system as a whole. This is less likely than the "hurting systems" approach to point to subsystems that have previously been unsupported or badly supported, since it focuses on areas that are critical to the functions of the organization.

Which of these approaches to take—if any—should be a function of how the problem is perceived. If the purpose for implementing the automation technology is to achieve some specific goal or solve some specific operational problem, then the sociotechnical approach may make more sense, since it encourages beginning with functionally critical areas. On the other hand, if there is a clearly hurting system but no strong sense of overall organizational interest, then the hurting system approach may be more appropriate. If a new group is being started which will be performing tasks that can be supported by the technology being contemplated, then that may be the place to start. Finally, there may be cases where the common sense approach of going for the easiest victory first is ideal. While it is difficult to generalize about where to start, it is not a decision that should be made independently of other phases in the planning process—in particular, deciding what the problem is that automation is expected to solve.
Chapter 6

USING THEORY: IMPLEMENTATION

6.1 How is the new technology introduced?

The introduction of office automation technology is a phase that includes a number of critical components that can significantly affect the organizational success of the new system. These components include: announcements, both those that precede studies and those that precede actual installation of new equipment and systems; the physical introduction of equipment into the workplace; and the training of users.

"Announcement" implies a one-way communication process, and to some extent this is likely to be inevitable in implementation. However participative an organization is, there are going to be implementation issues on which one person has information that has to be transferred to others. However, announcements of the one-way sort are only one part of the communications strategy that Galitz (1980), for example, argues is critical to implementation success:
Informal communications (such as rumor) can distort facts, create misunderstanding and cause resentments that result in a system's rejection even before its arrival. The best way to confront rumor is to ensure that formal communication is plentiful and continual so that it anticipates and guides information passing through informal channels. Communicated information should be relevant and reassuring and should begin as early as possible, including such things as goals, benefits, role definitions and projected schedules.

Ideally, the schedule for installation of equipment will have been thoroughly considered in the planning phase and decisions adequately communicated to the affected parties. This does not always occur, however, and the results can be very negative. A newspaper reporter, for example, found out the date her department was changing over to VDTs by coming into work and finding a workman removing her typewriter: her attitude toward the system was not improved by this encounter. Unforeseen physical problems can also be uncovered in installation that, if unaddressed, can hinder acceptance: it is particularly difficult to anticipate the perceived noise level of an installation beforehand, yet this can be a major source of irritation.

Where and when people are trained in the use of the new system can be as important as which people are selected for training. Off-the-job training for word processing operators has been a fairly common vendor service, although this is beginning to change as training costs escalate and threaten margins. Leaving the office for training can have some positive effects, if only because it is a break in the routine, but it can also create tensions if the principals who are depending on the
operator/secretaries are not fully convinced of the need for off-site training. Timing can also be critical. Training too far in advance of full implementation can be frustrating, as one law firm found out:

Training was frequently interrupted by hardware problems that persisted for the first month after the equipment was installed. Many trainees, unable to apply their new learning, decided that they needed a refresher course before starting work. (Rogoff 1980)

The insight that sociotechnical analysis brings to the issue of introduction is that all the critical components can properly be addressed as part of the planning process. Announcements, in fact, become a questionable concept, since all the users in the system will have been so involved in the planning phase of a classical sociotechnical design effort that there is nothing to be announced that is not already generally known. Furthermore, sociotechnical analysis clarifies in the planning stage the relationship between essentially technical processes like physical placement of machines and operator training, and their impacts on the social system of the office: the effect of office layout decisions on the social structure of the word processing center in section 5.2.1 is an example of this sort of relationship, although clearly it was not thought of during the planning phase.

The political analysis perspective also helps to clarify the role of communication in the installation phase. According to this perspective, differential access to information is a source
of different degrees of power within an organization. Differences in power in turn lead to politicized resistance. This theory would argue, therefore, for as wide a sharing of information as possible about the impending change, which is the argument that Galitz (1980) makes on the basis of empirical observation.

6.2 How are jobs going to change?

The impact of office automation technologies on individual jobs may be the single most important and sensitive issue in the implementation process. The issue does not include simply changes in the content of individual jobs, although that is obviously central; the working relationships of people in the office are also subject to change. It is not a sufficient response to the issue simply to state large generalities, whether the generality is that office jobs will deteriorate radically, improve just as radically, or undergo no significant change at all. The questions to be asked are what jobs can or will change, how will they change and why, and can the change be guided or directed? A host of situation-specific variables like company personnel policy and local labor markets make general answers to this sort of question extremely tentative, but again some of the organizational theory we have been considering provides ways of looking systematically at individual situations.

The reader will recall from section 4.2 that Lawler and
Hackman identified what they called the four "core dimensions" of jobs that determine to a large degree motivation and performance: variety; autonomy; task identity; and feedback. Most job enrichment practitioners use some version of these dimensions to assess jobs for redesign. (Roy W. Walters 1975). They can also be used to analyze the impact of various ways of designing an automated office or to give insight into a particular employee's situation.

Matteis (1979) describes a major overhaul of Citibank's letter of credit operation that was undertaken in 1975 with job enrichment explicitly in mind. The restructuring, which involved massive data processing changes, resulted in the creation of "letter of credit processor" positions, with responsibility for handling all transactions relating to the issuance of letters of credit for customers within a given geographic area. This replaced an "assembly line" structure where individual clerks performed only a few operations and never had a sense of the whole transaction. Had Citibank chosen simply to automate additional portions of the existing process, the effects on individual jobs would have been very different: in particular, the degree of variety and task identity would have been significantly less. Matteis also notes that feedback is provided directly to the processor by the customer.

The work-station professionals have responded visibly. They take a proprietary interest in both "their customers and the knowledge they have about those customers, the transactions, and the technology they 'own.'"...The
employees are talking to customers again, as in the old
days. They are answering questions and handling problems
about transactions they themselves have processed,
getting instant feedback on their own performance from
the people they perform it for.

There is some possibility of dissatisfaction along the
dimension of autonomy, since the letter of credit procedure is
fairly routinized and not subject to much individual discretion
at the processor level. Furthermore, Matteis notes that the
focus on task identity may have overcorrected for the previous
fragmentation. "While the workers like the responsibility and
the content of their 'beginning-to-end' jobs, a certain feeling
of isolation is also present." Nevertheless, the Citibank
experience represents an ambitious and well-documented attempt to
use job enrichment analysis in designing the automation of a
piece of office work.

The technique also gives insight into less sweeping changes.
In the word processing center cited in section 5.2.1, one
operator was emerging as the unofficial resident expert and
consultant to the other operators. On paper, the job of this
"guru," as her supervisor referred to her, is identical to that
of the other operators. In fact, however, an important element
of variety has been added in the form of her "consulting" duties,
apparently with positive effects on morale and performance. The
supervisor's task, at this point, is to try to change her
official job description to reflect the actual nature of the work
she does so that her pay can keep up with the Hertzberg
motivating factors.

Sociotechnical analysis comes at the question of job change in a less direct way, by focusing on the changes that automation technology can bring to the technical systems and through them to the social systems. The introduction of an office automation system at the Rand Corporation is a case in point (Anderson 1980). The system, which included word processing, electronic mail, and electronic filing, made possible a change in the technical system by which support work was done: instead of having a secretary perform both administrative and text-related tasks for a single researcher or small group, "Administrative Secretaries" performed the former and "Office Information System Specialists" the latter.

Anderson notes an improvement in support staff morale, but makes a telling remark about a particular implementation problem: "A few researchers were initially confused as to which support individual should be given a particular task." What has happened is that the relevant social system has changed from the very straightforward researcher–secretary dyad to a more complex form in which the researcher, in addition to performing research, now has the additional role of deciding on work allocation: the researchers' jobs have changed as well as the secretaries, although without a change in title.
6.3 Is there resistance to the new system?

Resistance can be thought of as any active or passive refusal to use or cooperate with all or part of a new system, and can range from outright sabotage to a quiet maintenance of old ways of doing some procedures. Resistance is not necessarily fatal to new office automation systems, of course. It may not even be a totally bad thing to have, if it forces a re-evaluation of assumptions and a search for ways of implementing change that are more organizationally effective. Still, most managers find themselves in a position where they need to understand resistance with a view toward overcoming it, not using it.

The planned change management literature devotes a good deal of attention to understanding and overcoming resistance to change. Huse (1975) has isolated some important characteristics of resistance:

**Factors Increasing Resistance to Change**

-- Change is consciously or unconsciously perceived as a threat.

-- Supervisors, workers, and groups will perceive as threats any changes they have not requested.

-- The magnitude of the resistance reflects the magnitude of the change.

**Factors Decreasing Resistance to Change**

-- Individuals must see some personal benefit to be gained before they will participate in change.

-- The greater the prestige of the supervisor, the greater the influence he or she can exert for change.
Specific feedback to a group about itself and its behavior can increase pressure for change.

If the group participates in the development of facts about itself, a shared perception of the need for change is likely to grow.

Opposition to change is reduced when those who will have to change behavior, jobs, etc., have a strong sense of belonging to the same group as those who are mandating the change.

A free flowing of information reduces resistance.

One major theme that comes out of Huse's factors is what we have been referring to as "ownership of the problem": if people see a proposed change as an imposition, a solution to somebody else's problem, then they are less likely to cooperate wholeheartedly with the change, particularly if the change can be perceived as a threat to them. The analysts in the government agency cited in section 5.1.1 found this to be the case when they went into a department to interview some technical professionals to see if some aspects of the department's work could be automated. They encountered substantial resistance in the interviewing process because, as it turned out, much of what these employees were doing involved complicated but extremely routine procedures. The employees felt they would be cutting their own throats by revealing how amenable to automation their jobs really were. Not only were the analysts not there because the employees felt they had a problem, but they were perceived as a threat to job security.

The causes of resistance are a central topic in the
political analysis perspective. As discussed above in section 4.5, resistance is seen as a function of the changes in power distribution brought about by changes in the information system. With most management information systems implementations, the major political questions are likely to arise between offices or departments; nevertheless, the political perspective has useful insights for the analysis of intraoffice resistance to change as well.

One aspect of organizational power that is helpful to have in mind for the political analysis of office automation is centrality. Centrality refers to the closeness of a person to the actual control of organizational activity, regardless of position in the traditional heirarchy (Schein 1980). Centrality is frequently illustrated by depicting the organization as a cone, rather than the typical triangle. (See Figure 2.) At any

![Figure 2](image)

Centrality: Y is higher in the organization but X is more central

given vertical level in the organization some people are going to be closer to the axis of the cone—more central—than others who are ostensibly their peers, or even their superiors. An office automation implementation may not affect the overt power
distribution in the office and yet, by affecting the centrality of various people, have a profound impact on the actual distribution of power.

Again, the government agency cited above offers an example. One of the first implementations made in the course of the automation project was to introduce stand-alone word processors into a number of different offices in order to generate interest and obtain feedback for later phases of the study. The machines were clearly intended as a limited augmentation of existing work systems: in no case was the office going to be restructured at this stage. Nevertheless, the analysts observed an interesting phenomenon. The clerical people most readily drawn to the new equipment were the younger workers with least seniority and centrality; the most central secretaries stayed away. What then happened was that the managers, curious about the new equipment, turned to the younger workers to find out about it, thus bypassing the very people on whom they usually relied on for "the real story." Along with—or perhaps because of—this loss of centrality, the older secretaries began to exhibit resistance to the whole concept of word processing.

6.4 Does the new system mean that the office has contact with different external organizations or with the same organizations in different ways?

If office automation were simply a case of providing a
different tool for doing the same job, like substituting electric
for manual typewriters, then the issue of altered external
relations would not come up. As it is, though, one of the most
important issues in some office automation implementations is the
effect that the new technology will have on the way the office
interacts with its organizational environment. At a minimum, the
office will probably have to deal with a new vendor or vendors.
In addition, its relations with other departments in the same
organization may change. It may interact differently with
outside organizations, and there may be new organizations like
unions or professional associations that members of the office
will begin to relate to.

In their study of the introduction of computers in English
banks, for example, Mumford and Banks (1967) noted that in the
pre-computer days, the loyalties of clerical employees were
toward the bank. Lifelong employment was the rule, and a
critical element of job satisfaction was the sense of belonging
to the bank "family." Employees whose new jobs included elements
of programming and analysis, however, soon began to develop a
stronger sense of loyalty to their professional identities and
colleagues in other organizations than to the bank. Similarly,
clerical employees who become involved in word processing may
find an active professional identity in the various word
processing associations that have grown up; there they are more
likely to find people who can appreciate the nature of the work
they do than in their own employing organizations, and
significant career advancement may come more quickly through
professional contacts than through the normal personnel channels
of the employer.

Understanding and coping with this new role identity can be
difficult for the employee, whose prior experience may not have
included any exposure to issues relevant to professional
employees: the conflicting demands of organizational
confidentiality and the free sharing of information with
professional colleagues, or the appropriate amount of employer
time and resources that can be devoted to professional society
activities. Managers may also have problems adjusting to the
changed roles and expectations of employees under them: signing
an expense form to permit a former secretary to attend a
professional society meeting is likely to be a difficult act for
many managers.

Although there are signs that office automation issues are
beginning to be factors in white collar unionization in the
United States, particularly the safety and health aspects of VDTs
(TNG 1980; Working Women 1980), unions as relevant outside
organizations are not yet as universally significant as they are
in Europe. Nevertheless, there are some specific areas where
office automation may bring about important interactions with
unions. Newspapers, for example, have found that significant
savings can result from having editors and reporters enter copy
directly into computer storage, which then drives an electronic photocomposition machine. The editorial staff, which may or may not be unionized, is in effect setting type, a job which is traditionally that of typographers and compositors; these latter are likely to be represented by a different union. Even ignoring the direct threats to jobs connected with typesetting, the possibilities for jurisdictional disputes in such cases are endless.

Even within an organization, relations between different offices may change as a result of office automation, sometimes in obvious and predictable ways, sometimes not. The planning office cited in section 5.1.1, for example, had word processing equipment that was compatible with that of the Human Resources Department. On one occasion, one of the Human Resources managers asked to borrow some word processing capacity to finish a batch of critical letters. It developed in the course of the job that the letters in question were termination notices for employees who were being let go in a cost-cutting drive, some of whom were friends of the planning group word processing operators. The effect on morale in the word processing center was marked.

One interpretation of this event is that the implied bond between the two departments, based on the shared technology, momentarily overshadowed the usual reluctance of the Human Resources group to permit the circulation of personnel information outside its own boundaries. In effect, office
automation blurred those boundaries.

The design of an office automation system can also change which specific positions have significant contact with other offices, and with outside organizations and people. In the Citibank experience (Matteis 1979; above sec. 6.2), clerks in the letter of credit office originally had substantial personal contact with customers inquiring about the state of their letters. When the office went over to a centralized data processing approach, most clerks lost any customer contact responsibility. The new system, however, put back the customer contact role by designing the information processing and retrieval systems to make it possible for one individual to access all the relevant information about a limited number of customers.

Mapping the environment and identifying the critical issues of organizational relationships within that environment is a task for which no simple and universally applicable guidelines exist. Nevertheless, selective application of the organizational theories we have been discussing can provide the manager with a greater understanding of this critical aspect of office automation implementation.

In assessing the likely changes in organizational relationships, both sociotechnical analysis and Office Analysis Methodology are useful approaches. Since they both define the processes of the office in terms of inputs and outputs, they
force an enumeration of all the organizations that either provide or receive information from the office in question. Both approaches assume a more or less distinct boundary around the office being analyzed, although sociotechnical analysis, in defining the social subsystems, may explore important connections to outside groups.

Given such a map, though, the techniques of planned change management may be more useful in sorting through the actual implications of the proposed change. By starting with the new system as the change problem and working out in circles to all the contributory problems and the forces for and against change, the static picture drawn by simple enumeration of input and output organizations becomes dynamic. Similarly, political analysis provides another set of questions to ask about groups identified as relevant: what are their interests and how will the proposed change affect their actual or perceived power?
Chapter 7
USING THEORY: MONITORING AND EVALUATING

While a great deal of attention is properly focused on planning and implementing office automation technologies, it is important not to neglect the ongoing operation once the technology is in place. The sheer passage of time may raise issues that were relevant but not pressing at the time of implementation: career paths for word processing operators, for example, should be considered from the beginning but may take on real urgency only after operators have been on their new jobs for a year or two and begin to wonder about next steps. Similarly, familiarity with the technology may change the definition of desirable features: menu-driven systems may be very helpful to new users of a technology like word processing or electronic mail, since the user chooses a function from a list on the screen, but frustrating to advanced users who would prefer the direct access of a command-driven system, which requires the user to remember and type in some codes.

Organizations are not static, of course, and
post-implementation changes in the structure and function of the
office are likely to affect the suitability of whatever
technology has been implemented. A relatively trivial example of
this was given in section 5.1.1, where a change in the
organizational context of the corporate development office made
its dictation technology less than ideal. A critical dimension
to examine in assessing any office automation technology,
therefore, is what issues may be raised over time, when the
technology is past the implementation stage.

Evaluation, of course, is closely akin to monitoring the
ongoing operation, but it has come to be a somewhat separate
issue because of the need that many vendors and managers feel to
justify office automation on the basis of cost or some other
quantifiable measure. The question of whether cost justification
is a futile goal to pursue is an interesting one to look into
(Driscoll 1980), but beyond the scope of this essay. The
attention that has been given to cost justification, however, has
made the evaluation of systems according to some set of criteria
a subject of much concern. This concern can be extended from
purely economic examination to an assessment of the
organizational effectiveness of an implemented technology. For
example, Bair (1980) links organizational evaluation to economic
evaluation by a methodology that ranks the workings of an office
in a hierarchy, from "mission" down to "action," assesses which
of the lower ones are critical to achieving the upper ones, and
observationally determines whether the introduction of technology has made it possible to do these lower level activities more efficiently. If so, the analyst can make the common-sense inference that organizational effectiveness has been improved.

7.1 Monitoring Issues

7.1.1 Are there changes in working behavior?

The working behavior of people is separate from job content and structure. It encompasses not what people do at work but the manner in which they do it: are tasks done quickly or slowly? in a regular rhythm throughout the day or irregularly? do people interact frequently with each other or are there long periods of isolation? are people cheerful conversationalists on the job or single-minded and irritable about interruptions? if there is informal communication does it stay within hierarchical levels or not? These are the sorts of questions that produce a description of working behavior. Obviously the answers to some of them are directly affected by job content and structure: it is hard to be a conversationalist if your job is to run a stamping press. Still, changes in working behavior (particularly in offices, where tasks are sometimes less clearly defined than in manufacturing situations) are enough a function of that ineffable variable "organizational climate" to be considered separately from changes in job content per se.
Working behavior may or may not be an important organizational goal in and of itself. In certain direct customer service situations, like airline reservation offices, working behavior characterized by friendliness and courtesy may be an absolute necessity for commercial success. In other situations such behavior may be much less important. In all cases, however, working behavior can serve as one index of organizational health: if working behavior is radically at odds with the sort of behavior that is important to organizational effectiveness—surly airline clerks, for example—then it should point out to management that some corrective action is needed. The dysfunctional behavior may be the result of individual personalities, job structure or—which is of concern to us in the present context—technology.

Sometimes changes in working behavior may be dictated by the particular technology that has been implemented. Harris and Mercer (1979) discuss a customer account updating system that was installed in a major English bank with multiple branches. They note that some clerks in the account processing area felt that there was greater variation in the pace of work than there had been under the manual system. Harris and Mercer suggest that this is the result of the particular system, which pauses briefly, creating slack time followed by catch-up periods. On the other hand, the system eliminates some major interruptions of work flow caused by manual procedures for balancing and interest
application, and so smooths out long term variations in work pace. Similarly, another bank study (Sole 1979), conducted in parallel with Harris and Mercer, shows that because of the strict timing requirements for data transmission from branches to the central office, clerks felt compelled to adopt a more rigid attitude toward time and schedules.

In other cases, working behavior may change in ways that are permitted but not necessarily required by the technology. The analysts in the government agency cited in section 5.1.1 observed that in many instances following the introduction of word processing equipment, the professional staff produced sloppier initial drafts of reports than they did prior to word processing. In one office, this resulted in so much additional time in making corrections that total document production time actually increased, and quality standards for initial drafts had to be re-established. The analysts also noted that many professional staff members had higher expectations for the quality of the final copy and more frequently requested small changes in wording and format.

One of the most radical working behavior changes permitted by automation technologies is the increasingly viable option of working at home, or telecommuting as it is sometimes called. A number of companies have begun experimenting with providing employees with terminals for home use (Business Week 1980). (Obviously, jobs like word processing operator and computer
programmer lend themselves better to this approach than some others do.) The effects on working behavior are significant: time management becomes more of a personal responsibility, and social contacts are drastically reduced. There is so little experience with telecommuting at this point that it is difficult to generalize about the effects, but it is clear that working behavior issues will be critical to its success or failure.

Any theoretical approach to the study of the office that focuses attention on human behavior is likely to help identify important elements of working behavior and think about them systematically. Of the approaches we have been looking at, sociotechnical analysis addresses itself most directly to questions of working behavior because of the emphasis it puts on the interrelation between the structure of the office and the way work is done.

A sociotechnical analysis of telecommuting for word processing operators, for example, would analyze the technical system by which material enters into the word processing area, goes to a particular operator, and then is keyboarded, checked, and returned to the originator. The various social subsystems that run in parallel to these technical phases would then be identified and characterized. At this point critical elements of working behavior would become clear.

Assume the assignment of work to operators is made by the supervisor on a job-by-job basis throughout the day. The
supervisor needs information on which operators are available and what skills are needed (e.g., proficiency with tabular material, ability to understand heavily accented dictation, etc.). This information can be provided via a number of different social subsystems: The supervisor can interact with each operator in separate one-to-one relations, with clusters of operators, or the whole group can interact. (See Figure 3.)

Figure 3
Alternative patterns of interaction

The role played by informal communication is likely to increase as the number of interactions increases. Telecommuting discourages the frequent "social" communication that may be the medium for passing information that is valuable in making assignments: knowing that one operator has a headache may make him or her a bad candidate for a close statistical typing assignment. To the extent that telecommuting does discourage communication of such information it is incompatible with the working behavior required by the particular social system that supports this part of the word processing operation.

Job enrichment, by focusing on the effects of job structure
on job satisfaction, naturally pays a great deal of attention to symptoms of dissatisfaction, most of which could be considered elements of working behavior. Absenteeism and tardiness are very obvious examples, but others might include a reluctance to volunteer information or to go beyond a literal interpretation of a job description. A job enrichment approach might appear to be a more direct way to address working behavior than sociotechnical analysis, and in many cases it may be perfectly adequate to direct the manager to ask useful questions. However, making the individual job the unit of analysis can steer the manager away from elements of working behavior that are critical to the office as a system. The amount of informal communication, for example, may seem irrelevant to the job satisfaction of individual workers, but it may be critical to the functioning of social subsystems.

7.1.2 Can the automated office adjust to changes in the organizational environment?

A given financial control system may be well adapted to the requirements of a division in a highly decentralized corporation. Should the corporation move toward a more decentralized style of operation, the control system will no longer be appropriate: it may not provide the required information, or it may encourage managerial behavior that is contrary to corporate interests. For this reason, anyone monitoring the ongoing effectiveness of the control system would consider how flexible it is in adapting to
changes in the larger organization.

Similarly, an office automation system may be perfectly adequate in the organizational context in which it was designed and implemented, but inadequate if that context changes. The electronic mail system that Sirbu cites (1980; above, chap. 4) is designed to support an organization in which delegation of responsibility stops at a certain level; only managers of a certain rank can authorize the sending of Mailgrams. If the organization using the system undergoes a change of managerial philosophy and wishes to push responsibility further down in the organization, the present system is not appropriate.

The experience of the marketing department discussed in section 5.1.3 is also instructive. In this case, one of the obstacles to full adoption of the centralized support unit was the insistence of upper marketing management on retaining personal secretarial support. This was overcome only by the dictate of top corporate management, but once it was, the system worked well for a year, with a few other adjustments. However, top management changed and, in the words of one observer, "radiated signals of 'Theory X'." The response of the marketing managers was to insist on personal support again--getting administrative support back where they could watch it and control it in a Theory X manner, presumably. The support unit quickly disintegrated, since the system was unable to adapt to the changed organizational environment.
Assessing a system's adaptability to change, of course, is well within the province of planned change management. By looking at the marketing department's support unit as an exercise in organizational change, several critical features stand out:

1. The relation of the change problem (centralized support) to other organizational problems (relations between marketing management and corporate management, attitudes of corporate management to the exercise of authority).

2. The tenuous balance between forces for change (the management services department that instigated the change and the original corporate management) and the forces against change (marketing management).

3. Ownership of the change problem: there was apparently no one within the marketing group with significant power who felt committed to the change.

Noting these aspects of the problem is not to suggest that if the management services department had used a planned change consultant to help implement the new system it would have been a success regardless of changes in corporate management. However, taking a planned change approach might have signaled the areas of vulnerability. It might still not have been possible to create a powerful internal sponsor, but the change managers might have been more aware of how dependent the system was on the current organizational climate in the absence of such a sponsor.

7.1.3 How does the system maintain itself?

As Chens and Wacker (1978; above, sec. 4.1) point out, one of Parsons' great organizing principles is that all social systems, be they nations or street gangs, have certain necessary
functions to perform if they are to survive: goal attainment; adaptation; integration; and latency. The last two of these are the general area under which fall the mechanisms that an office automation technology relies on to keep itself going. The integration mechanisms are those that enforce as much standardized behavior as the system requires and mediate conflicting demands for resources. The latency mechanisms are responsible for bringing new participants into the system, educating them in the procedures, and socializing them into the culture of the system.

It may seem strange to think of participation in, say, an electronic filing system as the sociological equivalent of belonging to a nation or a gang, but there are some similarities in terms of these generic systems. Goal attainment (deciding what the system is to file and how) and adaptation (responding to changes in organizational structure) have been covered in previous sections. The integration system would consist of all the devices, technical and managerial, that enforce or encourage participation in the filing system: management directives, limitations on amount of paper filing space made available, user group meetings, etc. The latency system would include all the training material and programs used to educate new members of the office in the use and advantages of the filing system, as well as the informal ways that information is passed about how the system really works, and how much you can get away with not filing if
you don't want to.

Understanding the integration and latency systems is crucial to assessing the filing system's ability to maintain itself. Whether or not the issue is phrased explicitly in Parsons' terms, a manager will have in mind a desired state for the integration and latency systems that support a given technology. If asked for, these expectations are likely to suggest fairly formal, organization chart-like systems: users should be taught according to the system manuals; conflicts over resources should be resolved in the appropriate chain of authority, with the priorities of the organization as the principle of arbitration. If pressed, most managers would admit to some less formal set of expectations that might include somewhat more flexibility.

At the same time, as the office automation technology is used it develops integration and latency systems that reflect the imperatives of the technology as well as the values of the users and the organization. The task facing the manager is to understand what those systems are and, as much as possible, bring them into congruence with his or her own desired systems.

The prioritizing of work in word processing installations is a typical case in which there may be disparities between the actual and the managerially desired integration systems. Most managers with indirect responsibility for a word processing center (i.e., not actual supervisors) are likely to feel that work should be done in the order it comes in, except for rush
jobs, which should be prioritized in order of importance to the goals of the organization. In practice, the prioritizing system is likely to be much more complex: one operator may have a real facility in reading the handwriting of a particular originator, and his or her work may tend to wait until that operator is free; rush jobs may be ranked in order of perceived organizational clout of the originator, or the nature of past relations between the user and the word processing installation; and so on.

Through a sociotechnical approach the manager can investigate more closely the technical and social subsystems at work in the installation and gain a better understanding of the integrating mechanisms that have developed; conceivably, changes can be made on the basis of that understanding. If, for example, a particular originator is being given a priority because he or she controls a scarce resource—an administrative secretary trained as a back-up operator, say—the social subsystem that includes the user, the secretary, and the word processing installation can be changed; additional back-up operators can be trained, resulting in less reliance on the single source.

The method of training new users of a system in the skills required is one of the most common latency issues, and one where disparities of understanding are great between various interested parties. Systems designers may feel that the system, whether through built-in teaching programs or manuals or both, is self-teaching. Managers who are responsible for the system but
will not personally use it regularly may hope that the systems
designers are right, but assume that human vendor support will
fill in any cracks. System users may feel that the only way to
teach the system is to sit down beside someone who knows how and
watch closely, and then be prepared for a long period of
experimentation and low productivity.

If the system is not truly self-teaching--if the manuals are
badly written or badly indexed--then a latency system is likely
to build up around resident experts or "gurus," as the financial
services supervisor put it (above, sec. 6.2). Such a system may
have much to recommend itself as a way of introducing new users
to the system, since the guru is likely to be particularly
skilled in fitting the system into its organizational context.
On the other hand, the guru system can come to embody
conventional wisdom about the nature and use of the system, and
so restrict experimentation with new uses. Furthermore, the
expectations of those in the guru role may change and be more
difficult to fulfill in the existing organizational structure;
should a guru leave because of unsatisfied expectations, the
technical system loses a skilled user and the latency system
suffers as well.

7.2 Evaluation Issues
7.2.1 What measures make sense for the organizational evaluation of an office automation technology?

If, in the planning phase of an office automation implementation, desired organizational outcomes have been specified, it may be relatively easy to devise measurable tests to judge the organizational effectiveness of the implementation. In the Citibank letter of credit operation (Matteis 1979; above sec. 6.2) there was an initial explicit commitment to job redesign: greater autonomy, control of whole tasks, significant customer interaction. Although there may be no strictly quantitative measures to judge the achievement of these goals, it is nevertheless possible to make objective observations of whether or not they have been achieved to the desired degree.

Standard instruments like the Roy W. Walters and Associates' Job Diagnosis Survey can be used before and after an implementation to judge the degree of change in the job characteristics. (Roy W. Walters 1975). Matteis (1979) indicates that in general at Citibank the objectives were met, with the information for this assessment drawn from regular feedback sessions and supplemental interviews with employees. Where shortfalls have been noted, they provide input to the planning process for the next stage.

In the absence of explicit and measurable goals, the manager seeking to assess organizational change must fall back on trying to ascertain the implicit organizational goals behind the implementation of the technology. The analytic techniques discussed in this essay may provide useful tools for such an
attempt. For example, if it is fairly clear that office automation was introduced to support a unit in desperate need of assistance—a "hurting system"—then using a planned change approach retroactively will help to identify the organizational causes of the original problem for which automation was introduced as a solution.

Assume, for instance, that inadequate communications between a company's field and central sales personnel about sales policies has been making it difficult to get approval for discounts or special terms in a timely way. This in turn has led to lost sales and dissatisfaction among the sales force. An electronic mail system might make it easier for a salesperson to communicate with the appropriate central contact to obtain approvals. If implementation of such a system was followed by a decrease in lost sales in excess of the cost of the system, then economic evaluation is fairly simple: in the absence of any other explanatory factors, the system should be judged a success.

The organizational evaluation might be very different. The problem of obtaining approvals could have been solved initially either by facilitating communication or by delegating more authority to the field sales force. The chosen solution, in effect, reinforces the control of the central office: this is the implicit organizational objective. The measure of the organizational success of the system must be whether or not the system increases the effectiveness of centralized control. Does
it balance the entrepreneurial drive of the field sales force against central authority in such a way that the sales force is neither demotivated nor reckless in granting discounts? What is the effect on turnover? Do customers perceive a positive benefit? Measurements to answer questions like these must be situation-specific, of course, but the planned change approach to problem analysis is very helpful in suggesting what questions may be relevant?

Ideally, the evaluation of an organizational change is a process of measuring present realities against original goals. In many situations, however, the exercise of inferring original goals from the nature of the change may seem unscientific and a waste of time. A perfectly adequate way to evaluate may simply be to analyze the post-change situation as though it were pre-change, using whatever theoretical approach seems most appropriate. There is no reason, for example, why Office Analysis Methodology cannot be used in an already automated office. If it suggests that some operations inherent in the automation seem to be involving unnecessary steps or are otherwise counterproductive, then there is evidence that the automation is not ideal from an organizational perspective. The situation may be much better than what went before—and here is where goals would be useful—but to the extent that the system is shown to have flaws, then an evaluation has taken place.
Chapter 8
A CHECKLIST OF ISSUES

Needs Assessment

What is the office or organizational unit in question and what does it do? (5.1.1)

- What physical or quasi-physical products does it produce? (E.g., reports, presentations, travel arrangements.)

- What is a useful boundary line to draw? If there are ambiguous cases, what should be included and excluded from "the office" for automation purposes?

- What social and technical subsystems exist within the office, and how do they interact in getting work done?

Is there a particular problem in the office that automation is expected to solve, and if so how can it be defined organizationally?

- Who are all the people who perceive a problem, and do they perceive it the same way?

- Is the problem general (e.g., low productivity) or specific (e.g., slow turnaround on correspondence)?

Who are the relevant players and what are their motives? (5.1.3)
- What parties inside and outside the office are affected by the problem? How would they be affected by any proposed solution?

- What are the forces working in favor of a change? Working against?

**Planning**

How will the system be designed? (5.2.1)

- Who are defined as the "users" of a proposed technology?

- What degree and what kind of user involvement in design is appropriate?

- What is the role of the outside designer/change agent?

Who will manage the implementation process? (5.2.2)

- How will new procedures be taught?

- Who will be responsible for dealing with ad hoc difficulties?

- If an outside organization is responsible for providing the technology, how will contact with it be handled?

What is the best place to start the implementation? (5.2.3)

- Does the situation seem to require a "quick win"?

- Should the initial implementation be used to build an intense but limited body of support within the organization?

- Which area, if automated, would potentially contribute most to the improvement of organizational effectiveness?

**Implementation**
How is the new technology to be introduced? (6.1)

- What is the communications process that introduces the study of the office? (One-way or two-way? Formal or informal?) The introduction of the new technology?

- To the extent that physical changes in the workplace are necessary, what will be their effects?

- What are the implications of different training programs for users?

How are jobs going to change? (6.2)

- Does the technology affect job security?

- What changes will occur in job content? What are the alternatives?

- If significant changes in job content occur is the organization's personnel system flexible enough to accommodate them?

Is there resistance to the new technology? (6.3)

- What is the nature of the resistance and what groups or individuals are exhibiting it?

- What are the factors in the technology or its implementation that are creating resistance?

- Does the new technology change existing patterns of power or centrality?

Does the new technology mean that the office has contact with different external organizations or with the same organizations in different ways? (6.4)

- Does the new technology bring with it the possibility of extensive contact with new professional or commercial contacts?
- Does it raise the prospect of union involvement or a change in the nature of union relations?

- Which individuals, if any, will find themselves with new "professional identities"? Does this involve any practical or cultural problems?

- Does the new technology affect the working relations of the office with other offices in the same organization?

- Which individuals, if any, experience significant gains or losses in amount of outside contact?

**Monitoring**

Are there changes in working behavior? (7.1.1)

- What working behaviors are appropriate to the tasks of the office?

- Is the new technology likely to require any changes in working behavior? If so, are the changes consistent with what is appropriate?

- What changes in working behavior does the new technology permit, though not require? If people accept the option to change behavior, will there be significant changes in the way the office functions?

Can the automated office adjust to changes in its organizational environment? (7.1.2)

- Does the new technology depend on a stable organizational environment for success? In particular, for what aspects of the organization is stability critical?

- What strategies will reduce the negative effects of organizational change?

How does the system maintain itself? (7.1.3)

- What are the ways in which standards for use of the new technology are maintained? How are disputes over
resources and other system conflicts resolved?
- How are new users introduced to the technology?

Evaluation

What measures make sense for the organizational evaluation of the technology? (7.1.4)

- Were there explicit organizational goals before the new technology was implemented?
- If not, can goals be inferred?
- What objective measures can be used to judge goal attainment?
- Are there standard testing techniques that will measure the desired dimensions?
- Is the cost of measurement greater than the likely benefits?
Chapter 9
SUMMARY

Typically, works that present different intellectual systems and attempt to relate them to a single problem, do so in the hopes of achieving a synthesis, a unified model that combines all the contributing inputs. This essay does not. Instead, what I have attempted to do, after briefly describing the major office automation technologies and some of their impacts on office work, is to present a series of different lenses through which managers might take a closer look at the particular organizational issues that face them as they contemplate implementing an office automation technology. Sometimes these lenses may be complementary; in other situations, they may make sense only as alternatives to one another. However, I am convinced—and I hope the illustrative case material supports my conviction—that these lenses, in whatever combination they are used, really can make things clearer.

This lack of synthesis may appear to some to be simply a failure to achieve it, and hence a cause for disappointment. If so, it is a disappointment I do not share, because I believe that
office automation is superlatively a subject to which contingency theory is applicable: there is no single model that adequately encompasses all of office automation, and the researcher and manager must be willing to use whatever makes sense in a given situation. As I tried to argue in Chapter 2, "office automation" is really only a term of convenience. The true subject of this essay is a vast and rapidly changing bundle of technologies that are used in different configurations to support operations of widely disparate organizations. Only a far bolder researcher than I would offer a unified theory that purports to explain all the organizational effects of such an aggressively collective noun as "office automation." To understand the organizational effects it is necessary to understand the specific technology, the specific organization, and the context of both. General theories are not very useful in such cases, so what I have attempted to do is show how some specific approaches to organizational questions can be used to make a manager's job a little easier.

But for all that, there is a single theme, if not a single theory: the inextricable connection between human beings, the work they do, the way they group themselves to do it, and the tools they use. Changing any one of these affects the others. The future of office automation will be determined in large part by the ability of managers to understand and come to grips with that fact.
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